Cable cross-reference tables Page 95

EDWARDS SYSTEMS TECHNOLOGY

INSTALLER'S

WIRE GUIDE

A CONCISE POCKET REFERENCE TO WIRE AND CABLE REQUIREMENTS FOR EST PRODUCTS AND SYSTEMS

FIRE ALARM ▪ SECURITY ▪ ACCESS CONTROL ▪ CCTV

Published by Edwards Systems Technology

In conjunction with Paige Electric Co., L.P.

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EST Installer's Wire Guide

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Wiring diagrams provided herein are for information and reference only and are not to be used for installation purposes. Consult the appropriate installation documents for wiring and configuration details.

This guidebook is for information only and is not intended as a substitute for verbatim legislated requirements. For authoritative specifications regarding the application of life safety, security, and access control systems, consult current editions of applicable codes and standards. For authoritative interpretation of those codes and standards, consult your local authority having jurisdiction.

While every effort has been made to ensure the accuracy and completeness of this guidebook, the authors and publishers assume no responsibility for errors, inaccuracies, omissions, or any inconsistencies herein.

For more information or questions relating to fire alarm products shown in this guide, contact EST. For more information or questions relating to cable products shown in this guide, contact Paige Electric.

Also from EST Press:

Security and Access Control Handbook
– A practical guide to application and system design

Handbook of Visual Notification Appliances for Fire Alarm Applications
– A practical guide to regulatory compliance

Glossary of Fire Alarm and Security Terminology
– A desk reference for life safety and security professionals

INTRODUCTION

This technical handbook has been designed to provide the users and installers of EST Systems with quick information in a condensed, user-friendly format.

EST/Paige part numbers contained in this handbook have highlighted cable characteristics to allow you to easily identify the cable you require for each installation.

Multiple charts and graphs detail technical data for wire and cable to assist you with calculations.

If we can provide additonal technical support, answer any of your daily questions, or assist with your additional requirements, we invite you to contact our technical service hotline.

TOLL FREE HOTLINE: 1-800-655-4497

It is our intention to keep the product information current and accurate. We can not cover specific applications or anticipate all requirements. All specifications are subject to change without notice.

For more information or questions relating to fire alarm products shown in this guide, contact EST.

For more information or questions relating to cable products shown in this guide, contact Paige Electric.

HOW TO USE THIS GUIDE

This book is provided to assist system designers and installers in the selection of cables for use with EST products. Those unfamiliar with EST Products should start by selecting a control panel.

The information shown for each control panel includes wiring diagrams and circuit tables.

The circuit type is designated with a letter, (A-Z). In the tables, the letters are listed on the left, on the drawings, letters appear in red diamonds. Once the circuit type (A-Z) is identified, the user can proceed to the Paige Catalog included in this guide.

Users familiar with EST products and their circuit types can proceed directly to the circuit type to obtain the cross reference.

Keys to symbols used in the diagrams can be found on pages 12, 13 and 16. Triangle symbols on diagrams refer to notes on the relevant catalog sheets and technical manuals. Please consult these for further information.

This book contains a wealth of reference information about cable selection and other related topics. This information can be found in the Reference Section.

As always, your comments are welcome. Please let us know how we can improve this guide.

For additional copies, contact: EST Marketing:

By e-mail at: EST.marketing@edwards.spx.com

By telephone: 888-378-2329

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EST PRODUCTS (CONTINUED)

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EST PRODUCT OVERVIEW

Over a century ago when Robert Edwards installed the world's first electric fire alarm bell in a New York City church, he began a tradition of innovation that would chart the course of building safety and security for the next 130 years. From pioneering work in multisensor technology, to award-winning design breakthroughs, the company that bears his name has established itself as the leader in cutting-edge systems and technology. Today, that name is synonymous with innovation and quality, and Edwards Systems Technology is widely regarded as the company that has achieved some of the most significant and forward-looking advances in its field. Among EST's innovations you'll find:

Signature Series: the world's first truly intelligent multisensor smoke detector combines the output from three sensing elements and compares the results over time against sophisticated algorithms that characterize different types of combustion.

Synergy Enabled EST3: the first multi-function network control platform to earn across-the-board listings for fire detection, security, and access control.

EST peer-to-peer networking: an innovation that rendered much of the industry's master/slave networks obsolete virtually overnight.

Genesis Series: the world's smallest and slimmest line of audible and visual notification appliances eliminates bulky specular reflectors used in other emergency strobes and adds design appeal.

In this guide you will find EST products organized into the following subsections:

- Control Panels, FireWorks and Booster Power Supplies
- Initiating Devices: Manual Stations, EC Detectors and other detectors
- Notification Appliances
- Signature Analog Addressable Devices
- Accessories

CONTROL PANELS

FIRESHIELD



The FireShield family of conventional panels and accessories consists of three panels, a DACT/dialer, serial remote annunciators and relays, city tie modules and reverse polarity modules. FireShield's ingenious initiating device circuits (IDCs) can be programmed for one of eight configurations. Several of these configurations allow the use of one zone to do the work of two. Verified detection circuits allow detectors and contact devices (such as pull stations) to be installed on the same zone. Combination circuits allow waterflow switches and their associated valve tamper switches to be connected on a common two-wire IDC.

FireShield panels are available in three sizes and can be ordered with or without the optional DACT:

> FS302 – The three-zone FS302 is ideal for use as a sprinkler supervisory panel. It includes three Class B IDCs and two Class B NACs.
>
> FS502 – Factory configured with five Class B IDCs and two Class B NACs.
>
> FS1004 – Factory configured with 10 Class B IDCs and four Class B NACs.

On the FS502 and FS104, IDCs or NACs can be paired to form single Class A circuits.

All panels are available in a red or gray finish.

Following Page:

The optional DACT/Dialer is a multifunction module that provides communications, modem capability, and LCD display functions. Its primary function is as a Digital Alarm Communicator Transmitter (DACT).

The FSRSI is ideal for common system annunciation. It includes five LEDs and a local silence/lamp test switch.

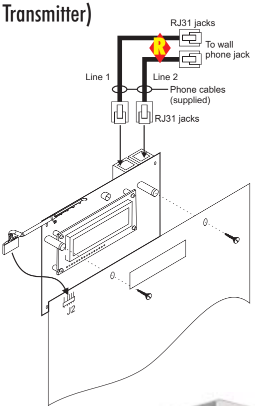
The FSRZI-A is used to indicate zones in the alarm state. It contains five red LEDs. The panel can support two modules programmed for each selection.

The Remote Relay Module (FSRRM) can be configured to function in either a zone relay mode or a common system mode.

CONTROL PANELS

FIRESHIELD

DACT (Digital Alarm Communicator Transmitter)



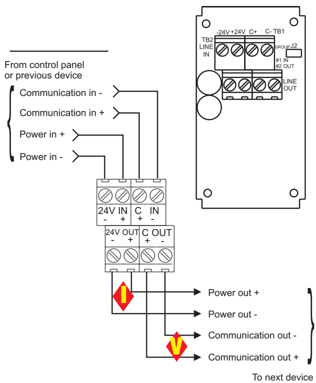


FSRSI (Remote System Indicator)

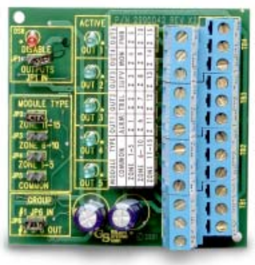


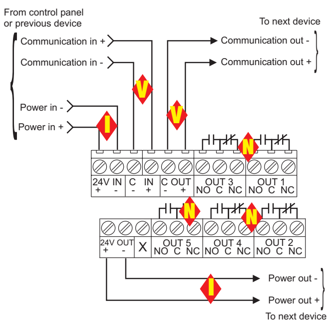
FSRZI-A (Remote Zone Indicator)





FSRRM (Remote Relay Module)





Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

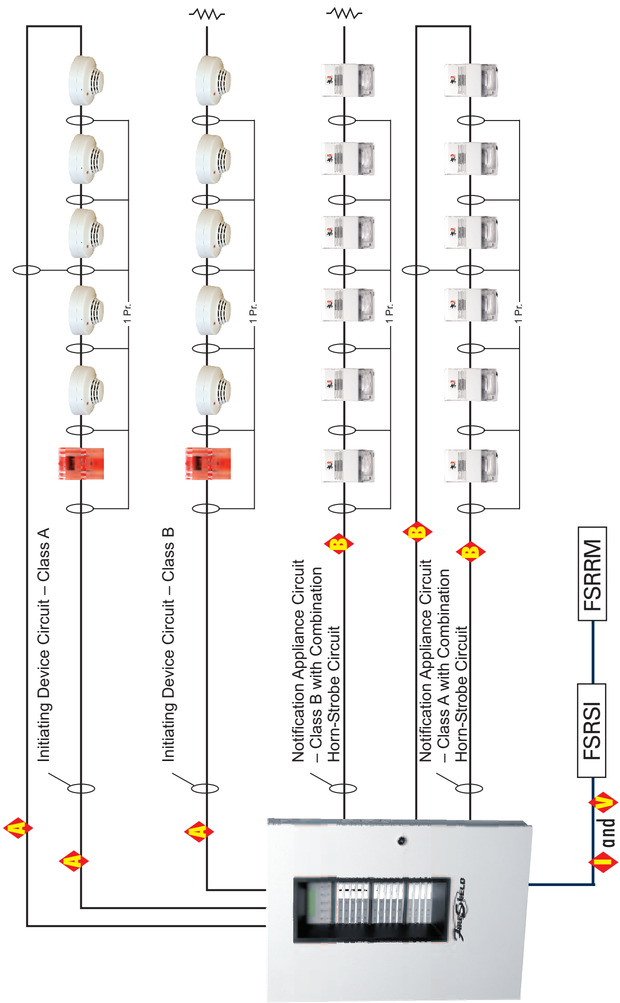
CIRCUIT REFERENCE TABLE - FIRESHIELD

Circuit Reference Table - FireShield					
Ref/Pg		Circuit Type	Gauges	Description	Notes
A	95	Initiating Device Circuit (IDC)	18 AWG to 12AWG	TFN, THHN, FPL, FPLR, FPLP	Alarm, Waterflow, Supervisory & Monitor circuits
B	95	Notification Appliance Circuit (NAC) 24 VDC	18 AWG to 12AWG	TFN, THHN, FPL, FPLR, FPLP	Horns & Strobe circuits
I	95	24 VDC Power distribution (Aux)	18 AWG to 12AWG	TFN, THHN, FPL, FPLR, FPLP	Power for 4 Wire Detector, Relay, FSRSI, FSRZI-A, FSRRM. AWG depends on voltage drop
N	95	Relay Module (FSRRM)	18 AWG to 12 AWG	TFN, THHN, FPL, FPLR, FPLP	Five dry contact relays. Form C configurable as zone or common
R	-	Telephone Line - DACT connection to RJ31X jack	7 ft long cable supplied with FSDACT		Plug to plug cable
V	99	Serial Communication Bus for remote annunciator & relays	18 AWG to 12AWG	FPL, FPLR, FPLP	Wiring for the FSRSI, FSRZI-A or FSRRM.
For maximum wire lengths see the tables, formulas and matrix in the reference section. For more detail on wiring specifications refer to the product manuals and installation sheets for the specific product.					

For cable part numbers turn to the Paige / EST Cross Reference Table on the page indicated.

CONTROL PANELS

FIRESHIELD WIRING DIAGRAM



Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

QUICKSTART QSC

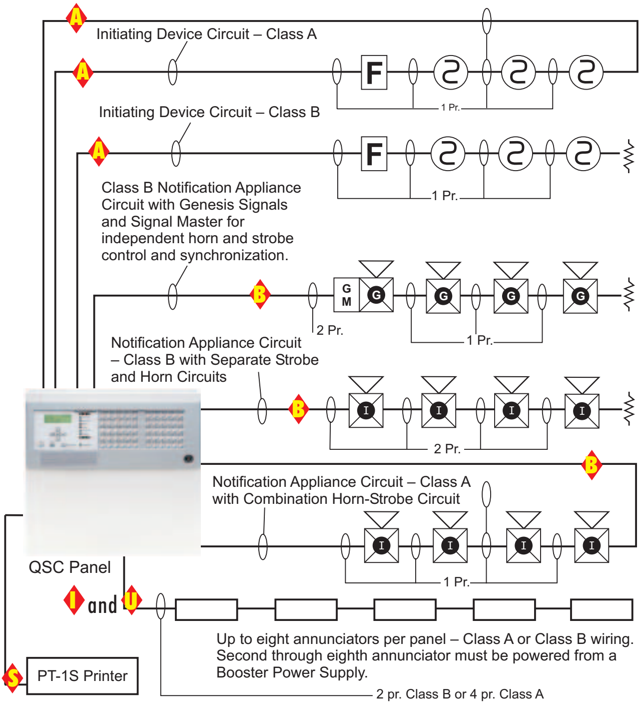


EST's QSC life safety control panel provides a cost-effective solution for larger conventional life safety applications. Supporting up to 48 conventional Class B or a combination of 40 Class A and Class B initiating circuits, this panel leaves plenty of room to grow. QSC is compatible with either two- or four-wire conventional detectors. QuickStart's modular design brings flexibility to every installation. Option cards provide a dialer, auxiliary relays and additional system capacity. QSC also supports as many as eight remote annunciators and up to 60 programmable front panel switches with dual LEDs for system control and display.

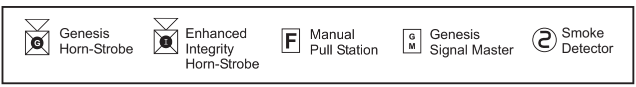
CONTROL PANELS

QUICKSTART QSC CONVENTIONAL CIRCUIT OPTIONS

Consult the QuickStart Wiring Reference Table on page 18 for further details.



Legend



CONTROL PANELS

QUICKSTART QS1



EST's QS1 life safety control panel brings big-system intelligent control to small applications. Supporting up to 250 intelligent detectors and modules, QS1 takes full advantage of EST's exclusive Signature Series technology, which provides electronic addressing, automatic device mapping, environmental compensation, and true multisensor detection. QuickStart's innovative design makes it easy to add a dialer or extra auxiliary relays. QS1 also supports as many as eight remote annunciators and up to 30 programmable front panel switches with dual LEDs for system control and display. The benefits brought by QS1 to retrofit applications underscore the true potential of this powerful system. As an intelligent panel, QS1 supports Signature Series devices, which can use existing wiring in most retrofit applications. This makes upgrading from a conventional system to analog control a simple operation with minimal disruption to normal operations at the site.

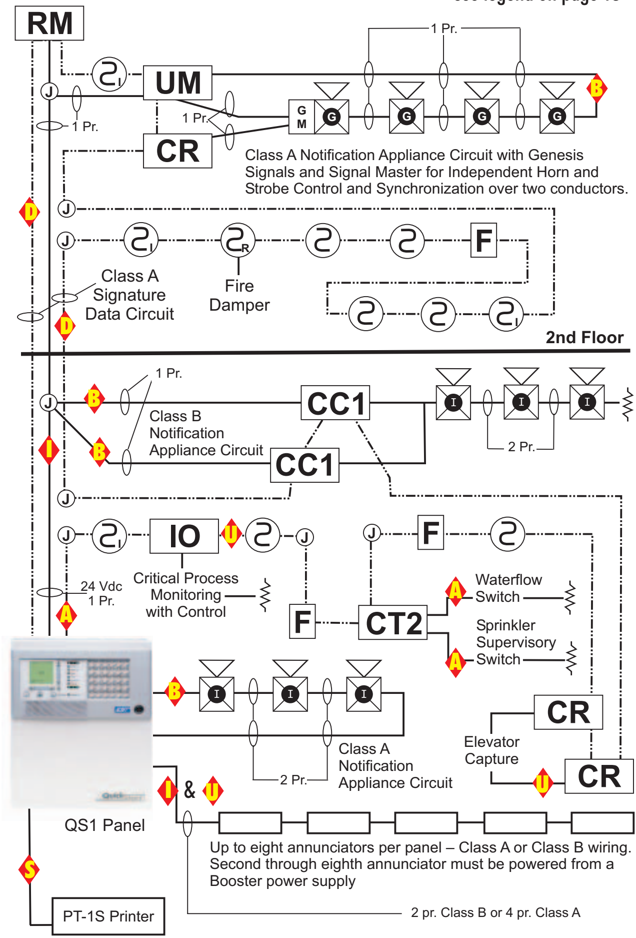
Legend for diagrams on pages 14 & 15

I	Enhanced Integrity Horn-Strobe	R	Smoke Detector with Relay Base		End-of-Line Resistor	CR	Control Relay Module
G	Genesis Horn-Strobe	I	Smoke Detector with Isolator Base	IO	Programmable I/O Module	CC1	Signal Module
G M	Genesis Signal Master	2	2-Wire Smoke Detector	UM	Universal I/O Module	RM	Riser Monitor Module
	Smoke Detector	F	Manual Pull Station	CT2	Dual Circuit Input Module	MM1	Monitor Module
						J	Junction Box

QUICKSTART QS1 CLASS A SIGNATURE DATA CIRCUIT

Consult the QuickStart Wiring Reference Table on page 18 for further details.

see legend on page 13

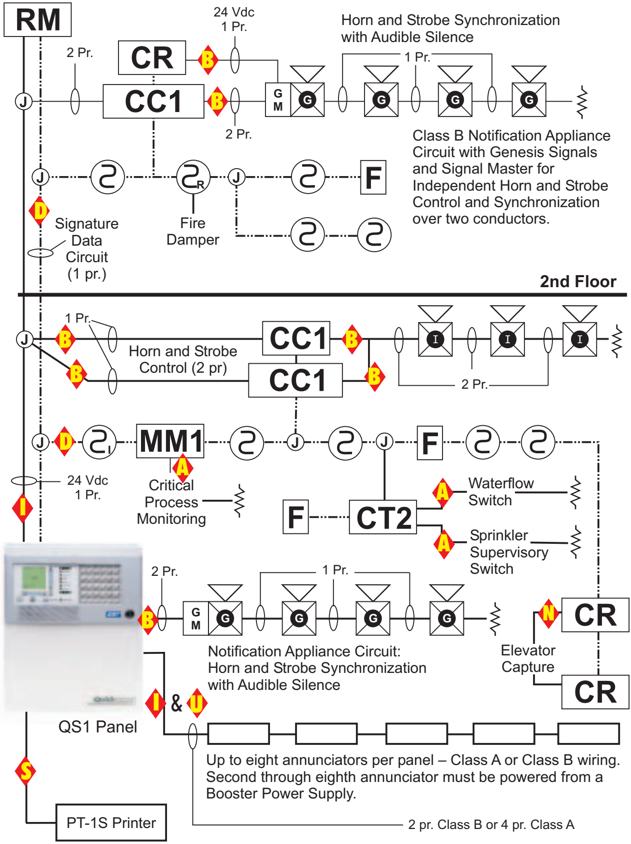


Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

QUICKSTART QS1 CLASS B SIGNATURE DATA CIRCUIT

Consult the QuickStart Wiring Reference Table on page 18 for further details.

see legend on page 13



Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

CONTROL PANELS

QUICKSTART QS4



EST's QS4 QuickStart life safety control panel provides conventional and intelligent addressable circuits in a single intelligent control panel. Supporting up to 1,000 intelligent detectors and modules, QS4 takes full advantage of EST's exclusive Signature Series technology, which provides electronic addressing, automatic device mapping, environmental compensation, and true multisensor detection. As a hybrid system, QS4 combines support for four Signature addressable circuits (1000 addressable points) along with up to 48 conventional Class B or a combination of 40 Class A and Class B initiating circuits. Compatible with either two- or four-wire detectors, conventional detectors. QuickStart's design leaves plenty of room for system expansion. Option cards include a dialer, auxiliary relays, and additional system capacity. The QS4 also supports as many as eight remote annunciators and up to 60 programmable front panel switches with dual LEDs for system control and display.

Legend for diagram on page 17

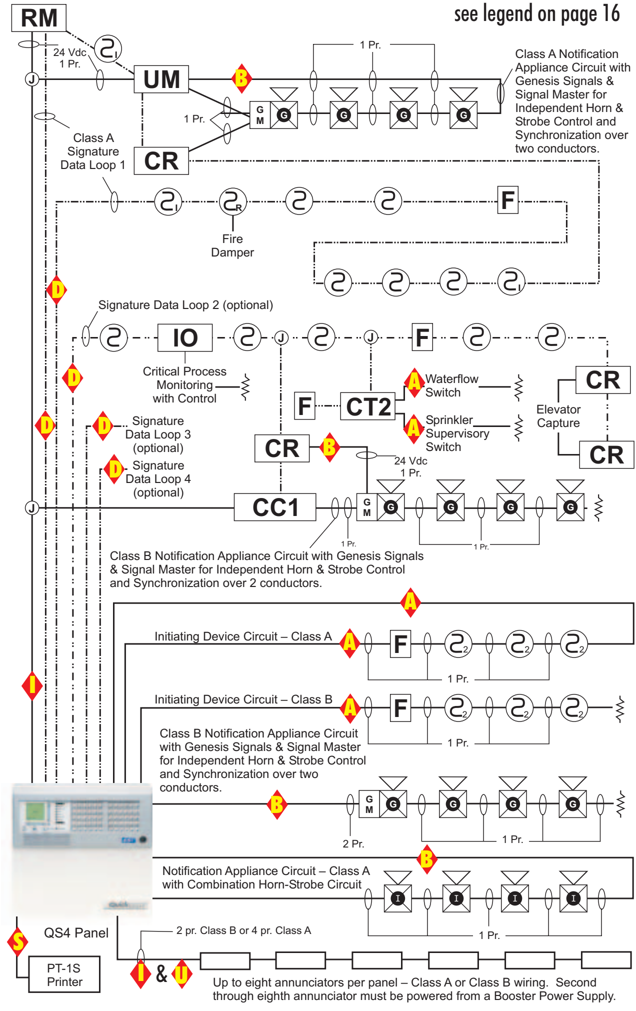
Enhanced Integrity Horn-Strobe	Smoke Detector with Relay Base	End-of-Line Resistor	CR Control Relay Module
Genesis Horn-Strobe	Smoke Detector with Isolator Base	IO Programmable I/O Module	CC1 Signal Module
GM Genesis Signal Master	2-Wire Smoke Detector	UM Universal I/O Module	RM Riser Monitor Module
Smoke Detector	F Manual Pull Station	CT2 Dual Circuit Input Module	MM1 Monitor Module
			J Junction Box

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

CONTROL PANELS

QUICKSTART WIRING DIAGRAM

see legend on page 16



CONTROL PANELS

CIRCUIT REFERENCE TABLE - QUICKSTART (QS1, QS4, QSC)

For cable part numbers turn to the Paige/EST Cross Reference Table on the page indicated

Ref	Pg	Circuit Type	Gauges	Description	Notes
A	95	Initiating Device Circuit (IDC)	18 AWG to 12 AWG	TFN, THHN, FPL, FPLR, FPLP	Input circuits on ZB16-4, ZA8-2 and modules (CT1, CT2, WTM, MM, UM & MAB)
B	95	Notification Appliance Circuit (NAC) 24 Vdc	18 AWG to 12 AWG	TFN, THHN, FPL, FPLR, FPLP	Output Circuits on SLIC, ZB16-4, ZA8-2, and modules (CC1, CC2, UM, & MAB)
D	95	Signature Addressable Loop	18 AWG to 12 AWG	TFN, THHN, FPL, FPLR, FPLP	Loop Controller (SLIC) card to addressable devices
I	95	24 Vdc Power distribution (Smoke Acc. & AUX Power)	18 AWG to 12 AWG	TFN, THHN, FPL, FPLR, FPLP	4 Wire Detector/Relay/Annc. AWG depends on voltage drop
N	95	Relay Module (ZR8)	18 AWG to 12 AWG	TFN, THHN, FPL, FPLR, FPLP	Eight dry contact relays (ZR8) Form A or B configurable.
R	-	Telephone Line - DACT connection to RJ31X jack	7 ft cable supplied with FSDACT supplied with DACT		Terminal to Plug cable
S	99	RS-232 Communications (Printer Wiring)	18 AWG 4 cond. min.	FPL, FPLR, FPLP	50 Ft Max. Panel to Printer
U	98	Communications Network RS-485	18 AWG to 12 AWG	FPL, FPLR, FPLP	Annunciator to Panel and Network Annunciator

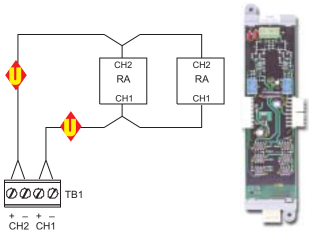
For maximum wire lengths see the tables, formulas and matrix in the reference section.
For more detail on wiring specifications refer to the product manuals and installation sheets for the specific product.

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

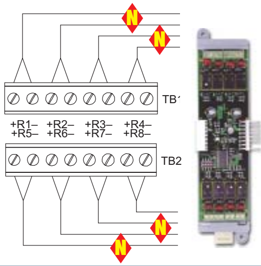
CONTROL PANELS

QUICKSTART OPTION CARDS

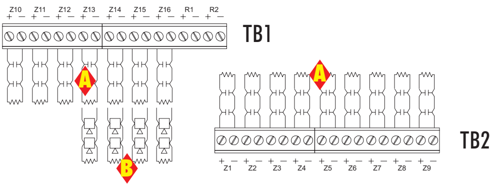
NT-A Class A RS-485 Card/UART Port



ZR8 Relay Card



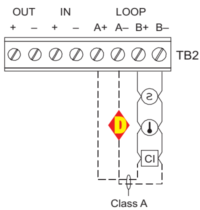
ZB16-4 Class B Zone Card





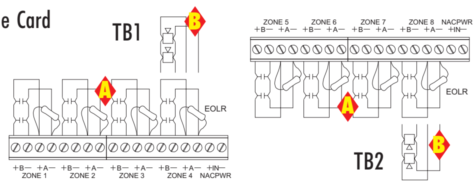


SLIC Signature Loop Intelligent Controller





ZA8-2 Class A Zone Card

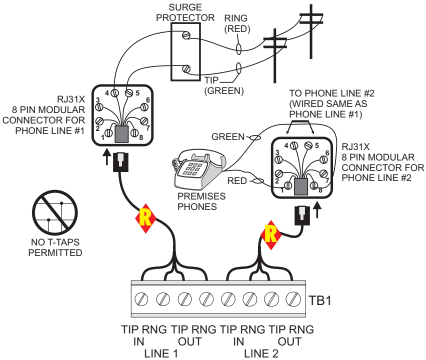


Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

QUICKSTART OPTION CARDS AND ACCESSORIES

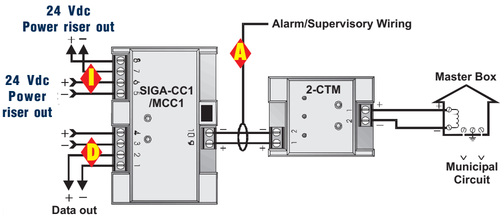
DLD Dual Line Dialer



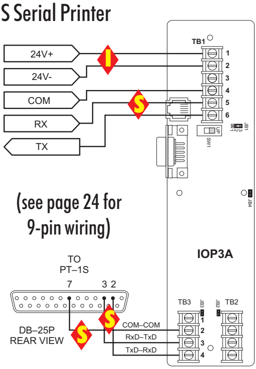


2-CTM City Tie Module



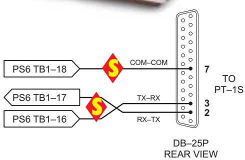


PT-1S Serial Printer



(see page 24 for 9-pin wiring)





Other Accessories:

CDR-3 Coder (for wiring diagram see page 33)

RPM Reverse Polarity Card (no wiring diagram available)

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

EST3



EST3 is a modular system uniquely designed to easily meet the needs of standalone single node systems or multimode networks. Fire alarm, security, access control and audio functions use the same fundamental components, simplifying system layouts.

EST3 is a superbly adaptable life safety system, lending itself to medium and large building applications. Cabinets are available with room for system batteries up to 65 Amp hours. With EST3, one 24-volt battery supports up to to four power supplies. Each supply will support up to 7 Amp load. With four supplies, 28 Amps of current is available — all backed up by a common battery.

EST3 operates on a multi priority peer-to-peer token ring network. The multi-priority token ring gives EST3 exceptional response. EST3 token ring network configuration also permits vast distances between nodes. The allowable distance between nodes on #18 AWG (0.75mm2) is 5,000 ft (1,523 m). With 64 nodes supported on a network, the total network length is in excess of 300,000 ft (91,400 m), or nearly 60 miles! A single node supports up to 10 Signature loop controllers with 250 devices per loop, (2,500 points total per node, 160,000 points per network).

Taking full advantage of digital technology, up to eight channels of audio sources can be sent over a single twisted pair of wires between nodes. Coupling the inherent reliability and performance of zoned amplifiers with EST3 simplified user interfaces makes audio system design and operation both easy and dependable.

EST3 is the right choice for any medium to large application. Its multiplex functions are second to none in the industry today.

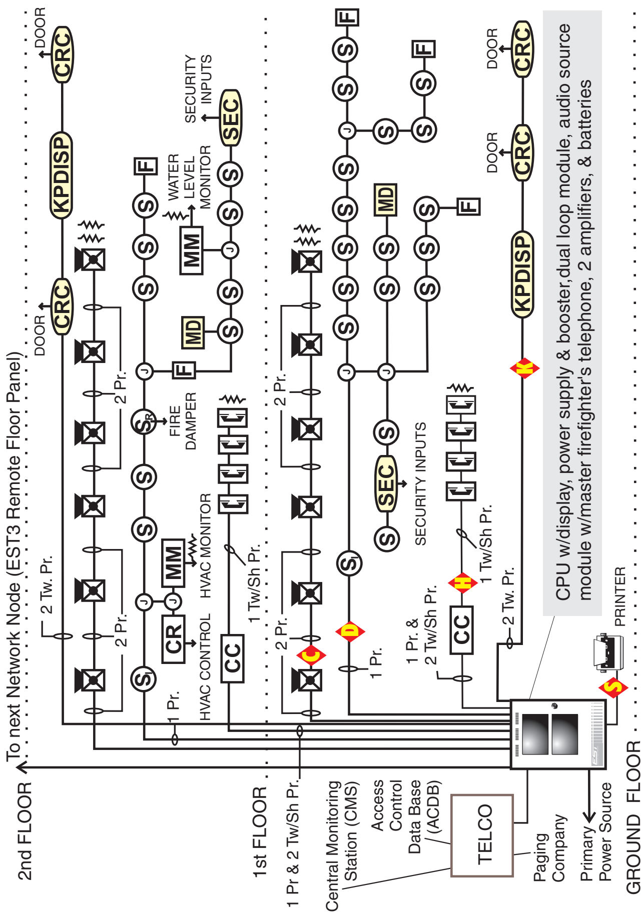
CIRCUIT REFERENCE TABLE - EST3

For cable part numbers turn to the Paige/EST Cross Reference Tables on the pages indicated below.

Ref/Pg		Circuit Type	Gauges	Description	Notes
A	95	Initiating Device Circuit (IDC)	18 AWG to 12 AWG	TFN/THHN, FPLR, FPL, FPLP	Input circuits on 3-IDC8/4 and modules (CT1, CT2, WTM, MM, UM & MAB)
B	95	Notification Appliance Circuit (NAC) 24 Vdc	18 AWG to 12 AWG	TFN/THHN, FPLR, FPL, FPLP	Output Circuits on ZA8-2 and modules (CC1, CC2, UM, & MAB)
C	95	Notification Appliance (NAC) Audio	18 AWG to 12 AWG	Twisted Pair - FPLR, FPL, FPLP	3-ZAxx to CC1 & CC2 & speakers
D	95	Signature Analog Addressable Loop	18 AWG to 12 AWG	TFN/THHN, FPLR, FPL, FPLP	Loop Controller (3-SSDC) to Signature devices.
E	95	Analog Addressable Loop	18 AWG to 12 AWG	TFN/THHN, FPLR, FPL, FPLP	3-AADC to Addressable devices (not Signature)
H	96	Firemen's Telephone	18 AWGt o 12 AWG	1 Pair Twisted Shielded	3-ASU to CC1, CC1 to Jack/Station.
I	95	24 Vdc Power distribution	18 AWG to 12 AWG	TFN/THHN, FPLR, FPL, FPLP	4 Wire Detector/Relay/Annc. AWG depends on voltage drop
K	97	Security (3-SAC) Bus	18 AWG to 14 AWG	FPLR, FPL, FPLP	3-SAC to CRC & KPDISP.
L	96	Card/PIN Reader	22 AWG to 16 AWG	FPLR, FPL, FPLP or CM, CMR, CMP	CRC to Card/PIN Reader.
M	96	Security Device Circuit	22 AWG to 16 AWG	FPLR, FPL, FPLP or CM, CMR, CMP	CRC or SEC-2 to Door Contact/ Request to Exit.
N	95	Relay Module (FSRRM)	18 AWG to 12 AWG	TFN/THHN, FPL, FPLR, FPLP	Five dry contact relays. Form C Configurable as zone or common
R	-	CO Telephone Line	Supplied with 3-Modcom	Supplied with 3-Modcom	3-Modcom to RJ31X, 7 feet, plug to plug, cable EST P/N 3601377.
S	99	RS-232Communications Printer/Fireworks	22 or 18 AWG 4 cond. min.	FPLR, FPL, FPLP or CM, CMR, CMP	50 feet Max. Panel to Printer or from Panel to Fireworks
T	98	Audio Network	18 AWG to 12 AWG	FPLR FPL, FPLP	5000 feet max between any three panels.
U	98	RS-485 Communications Network	18 AWG to 12 AWG	FPLR, FPL, FPLP	5000 feet max between any 3 panels.
W	100	Network Fiber Optics	9/125 Singlemode 62.5/125 mm or 100/140 mm Multimode	OFNR, OFNP	Fiber Optic (3-FIB) card
X	100	Netcom-16D Router Cable (Ethernet)	CAT 5E/6	CMR, CMP, CMG. CM	Cable from Fireworks to NETCOM-16D (300Ft. Max)
Y	100	Fireworks Short Haul Modems (FW-XPC/FW-XPL)	26 AWG Min. (4 Conductor)	Twisted Pairs Telephone cable	Cable for Modem to Modem connections (FW-XPC/FW-XPL)
For maximum wire lengths consult the reference section. For more detail on wiring specifications refer to the product manuals and installation sheets for the specific product.					

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

TYPICAL EST3 WIRING



CONTROL PANELS

EST3 NETWORK

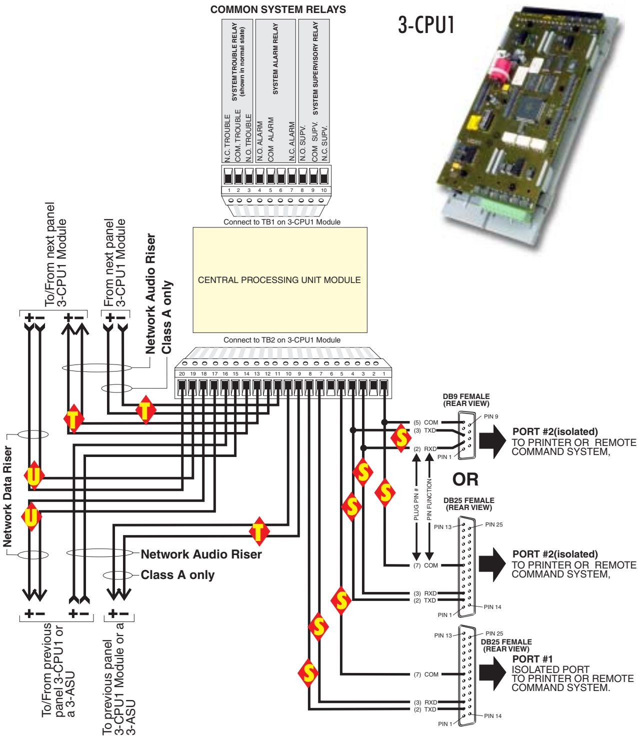
3-CPU1 Central Processor Unit Module

As a single node standalone system, the 3-CPU1 can control up to 19 local rail modules. For larger systems, up to 64 nodes interconnect on a peer-to-peer multi-priority token ring protocol network.

Communications Cards (mount to back of module)

3-RS232: Two optically-isolated RS-232 ports support connection of a printer and/or an external command center.

3-RS485A/B: The 3-RS485A card provides a Class A or Class B circuit for network communications signal and two additional circuits for Class A digitized audio signals. The 3-RS485B card provides one Class B circuit for network communications and one for the digitized audio signals.



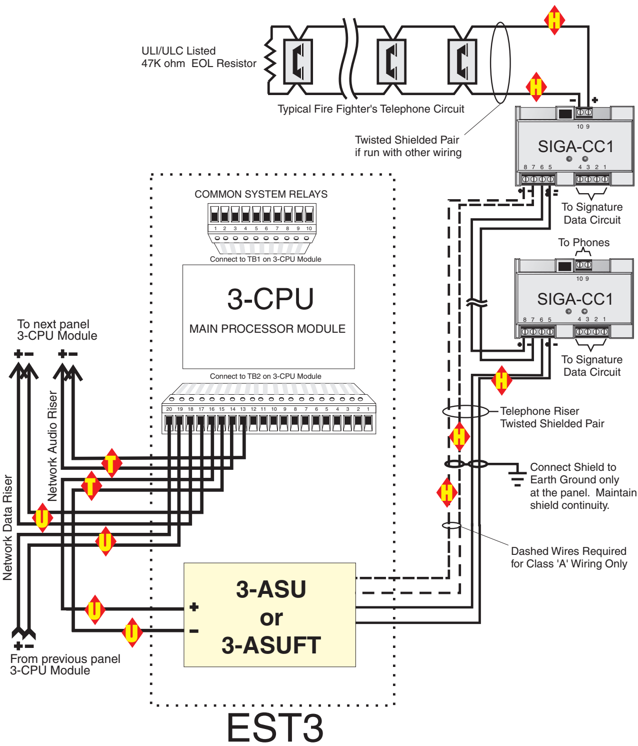
3-CPU1

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

EST3 NETWORK AUDIO



The Audio Source Unit (3-ASU/3-ASUFT) converts analog signals to digital signals. These units support connection of a local microphone, remote microphone, telephone voice line, and auxiliary audio input.



SIGNATURE DRIVER CONTROLLER MODULES

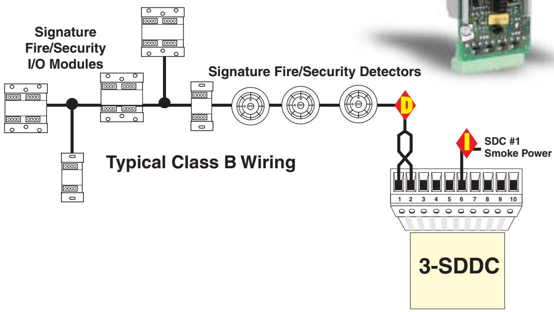
The 3-SSDC and 3-SDDC Signature Driver Controller modules provide an intelligent interface between the 3-CPU(1) module and Signature Series fire alarm and security devices.

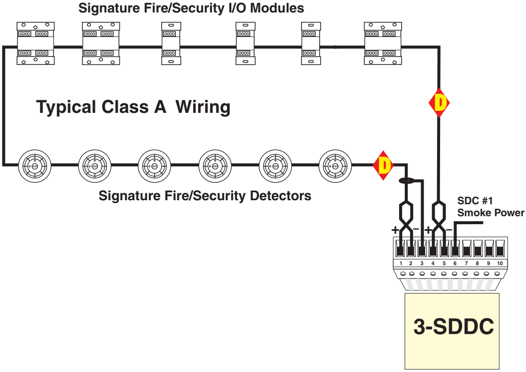
3-SSDC Single Signature Driver Controller Module (supports one Signature Data circuit)

3-SDDC Signature Dual Driver Controller Module (supports two Signature circuits)

3-SDC Signature Device Card (upgrades a 3-SSDC to a 3-SDDC)







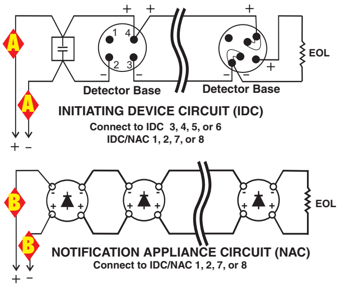
Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

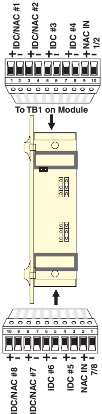
CONTROL PANELS

EST3 MODULES

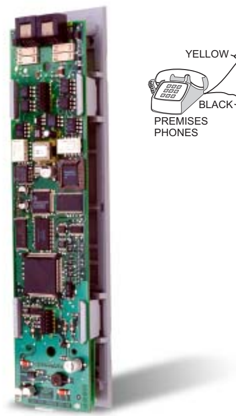
3-IDC8/4 Initiating Device Circuit (Hardwired) Module

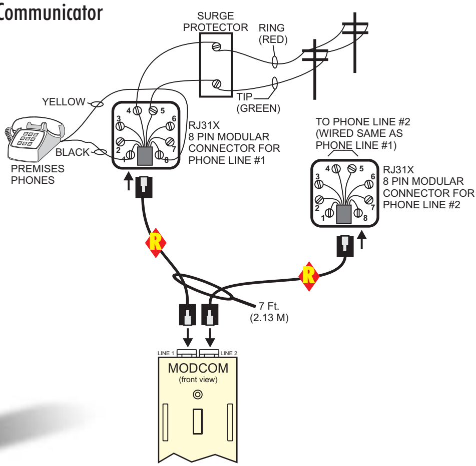






3-MODCOM Modem Communicator



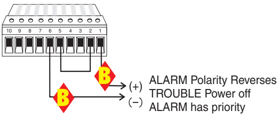


CONTROL PANELS

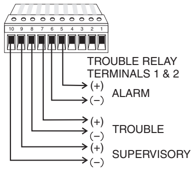
EST3 MODULES

3-OPS Off Premise Signaling Module

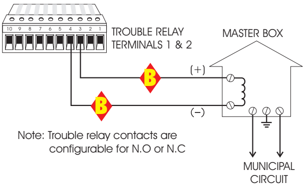




‘Old’ style reverse polarity operation

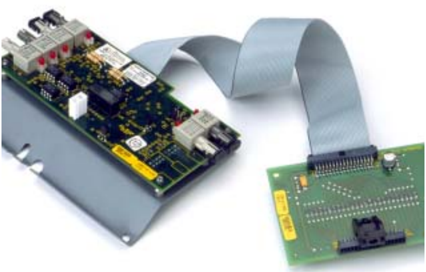


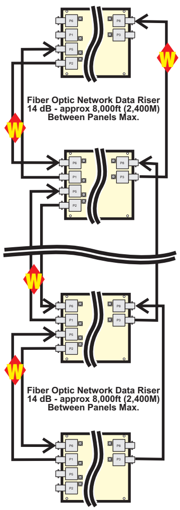
‘New’ style reverse polarity operation



City Tie Connection

Fiber Optics Interface

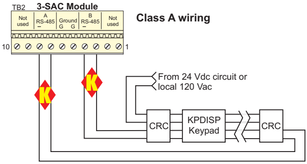


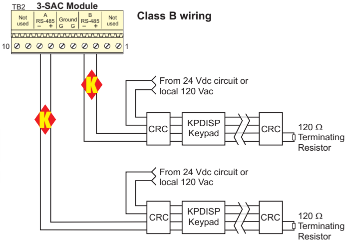


Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

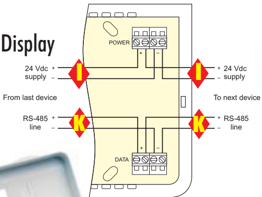
3-SAC
Security/Access Control Module







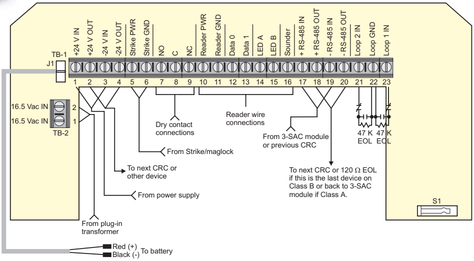
KPDISP
Keypad Display







CRC
Card Reader Controller

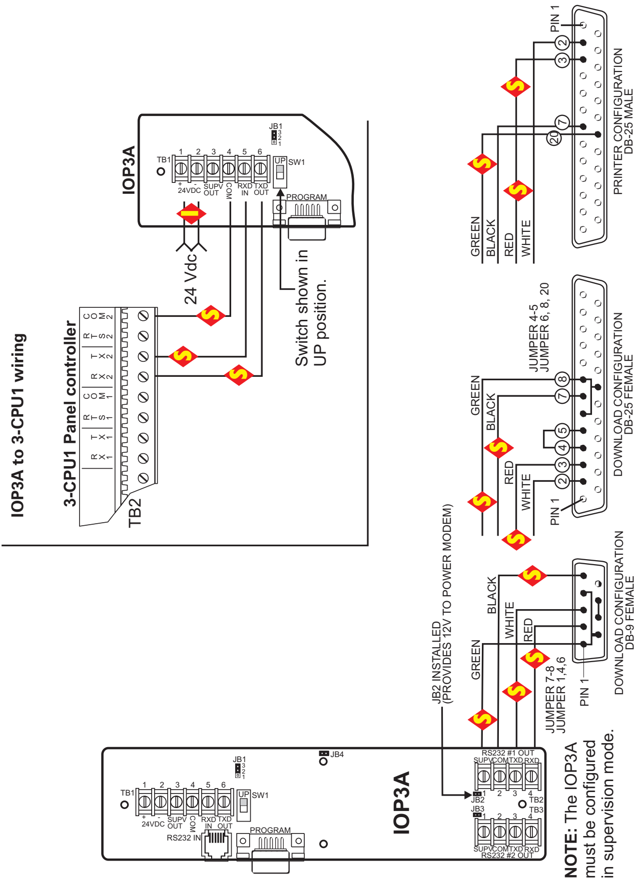


CONTROL PANELS

EST3 NETWORK ACCESSORIES

IOP3A Isolated RS-232 Card

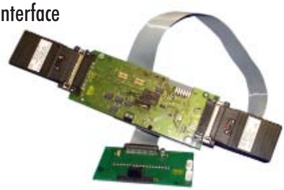




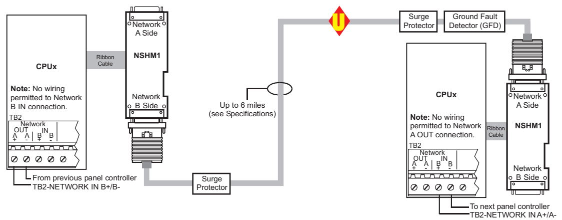
Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

EST3 NETWORK ACCESSORIES

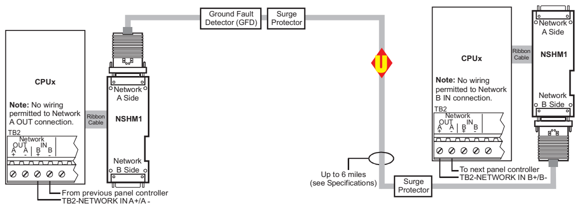
Network Short Haul Modem Communications Interface
3-NSHM1 single modem connection
3-NSHM2 two modem connection



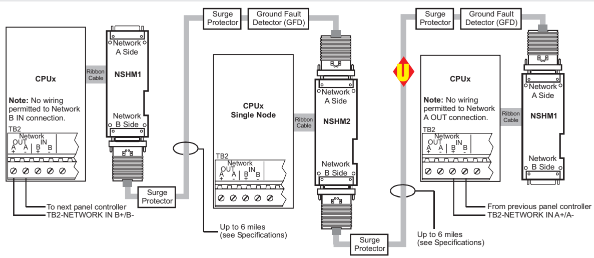
Network B to A wiring using the NSHM1



Network A to B wiring using the NSHM1



Network wiring using the NSHM2



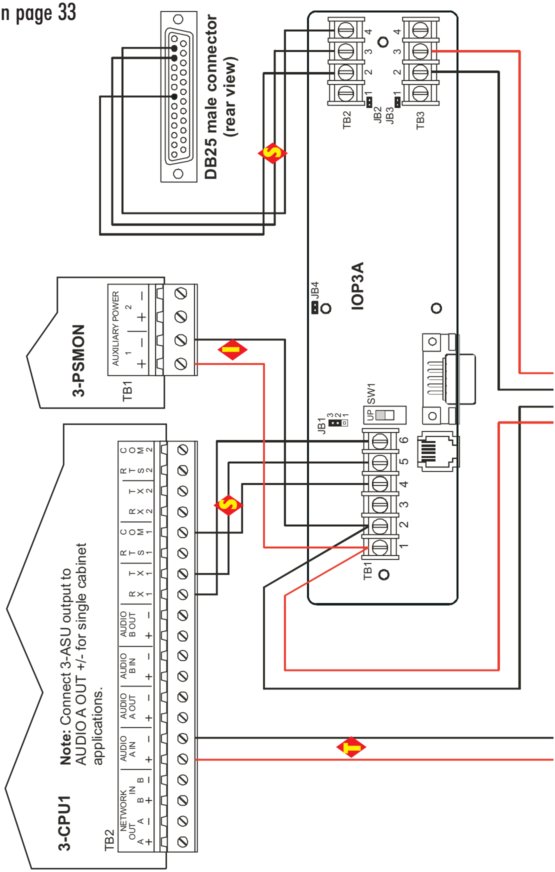
CONTROL PANELS

EST3 NETWORK ACCESSORIES

IOP3A RS-232 Optical Isolator Card



Wiring diagram
continues on page 33



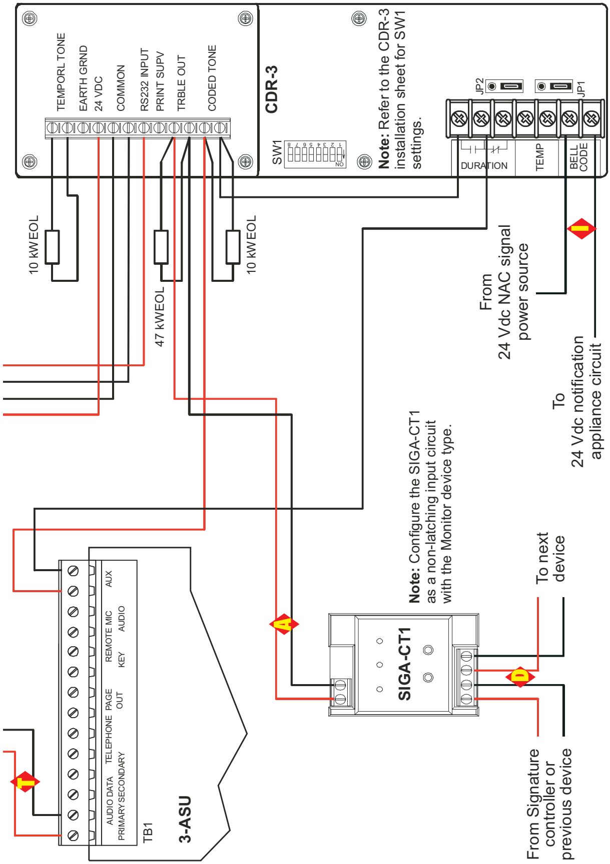
Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

CONTROL PANELS

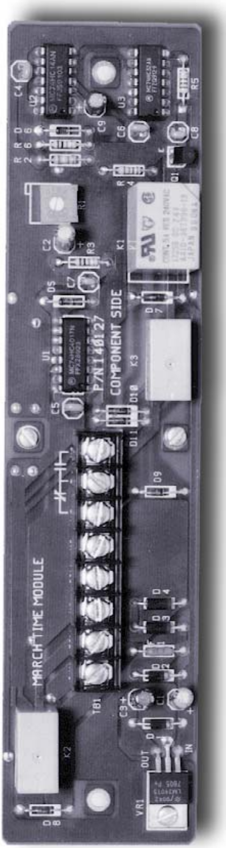
EST3 NETWORK ACCESSORIES

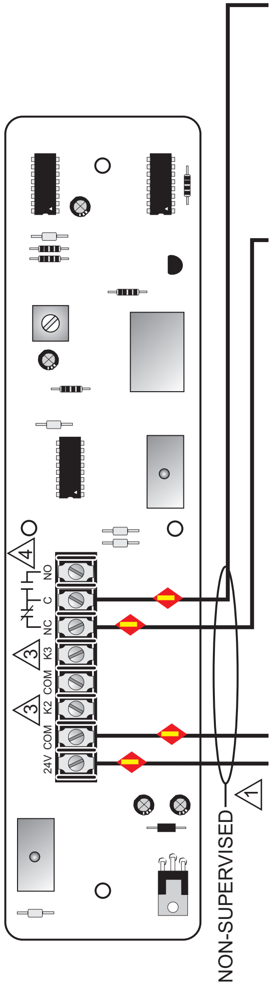
CDR-3 Coder





MTM-1 March Time Module

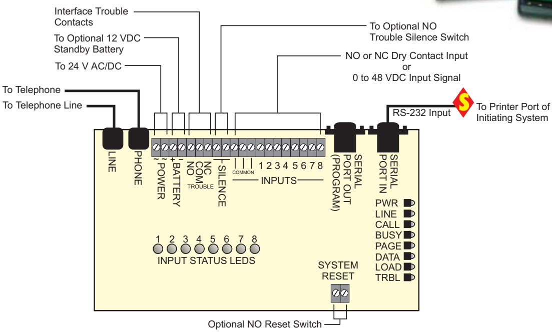




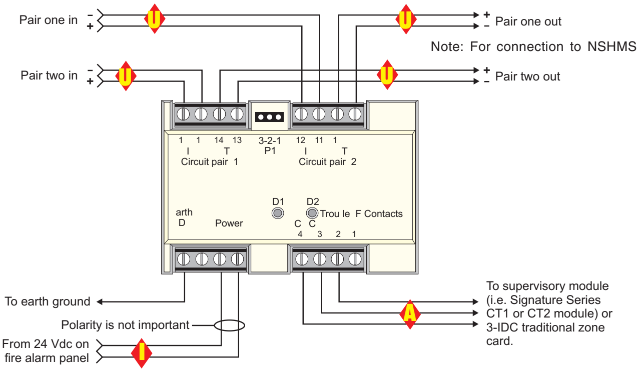
EST3 NETWORK ACCESSORIES

API-8/232ME Alphanumeric Pager Interface





GFD Fround Fault Detection Module



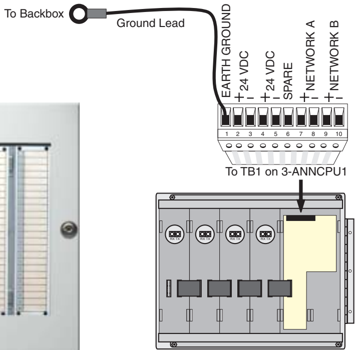
Other Accessories : PT-1S Serial Printer (see page 20 for wiring)

CONTROL PANELS

EST3 NETWORK ANNUNCIATORS

Remote Annunciator





Rear View

Use EST3 remote annunciators wherever a compact system status display is needed. Annunciator configurations include: LCD only display, LED only display, or combination LED and LCD display in a single enclosure. Display and control is provided by the 3-LCD and Control Display Modules.

Control/Display modules install over any annunciator support module, maximizing annunciator design flexibility. A lamp test feature can program to any spare control switch. If a 3-LCD display is installed in the annunciator, simply operate the Alarm Silence and Trouble Silence switches simultaneously to lamp test all LEDs. 3-REMICA remote microphones can also be installed in annunciator cabinets.

CONTROL PANELS

EST3 NETWORK ANNUNCIATORS

Envory Graphic Annunciator



ENVOY graphic annunciators and smoke control panels are designed to present complex status and control information in an easy to understand package. The design of ENVOY products permits users to rapidly determine system status and easily operate associated system controls. The addition of system LCD annunciators and remote microphones can turn ENVOY into a complete fire command station.

For wiring information see the EST3 wiring diagram on page 24.

CONTROL PANELS

FIREWORKS

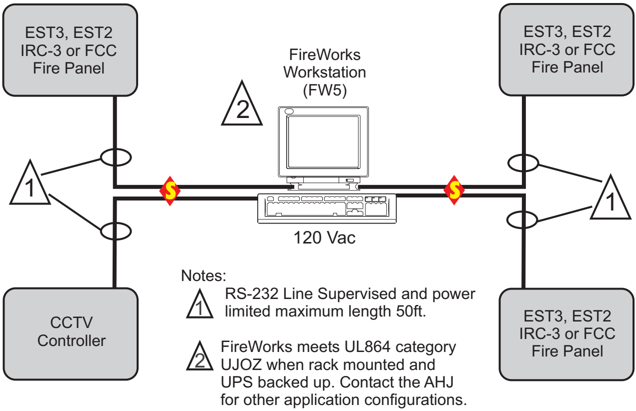
FireWorks Four Quadrant Display

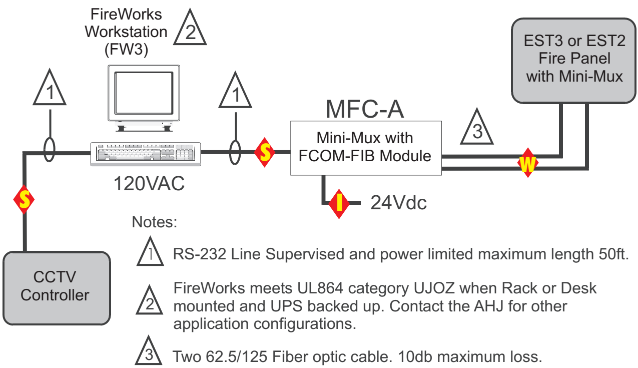


FireWorks is a family of software and hardware options designed to work in concert with EST life safety and property protection systems. FireWorks provides a simple user interface, taking what could be an overwhelmingly large amount of information and presenting it in an easy-to-understand format. FireWorks does this by dividing major system functions into easy-to-manage quadrants. These quadrants make the system very intuitive to use because information is presented logically. To further enhance usability, FireWorks is event driven. This greatly increases the user's ability to deal with system events by eliminating the confusion sometimes experienced when systems present all information at once. FireWorks automatically prioritizes the events for the user in an Event Quadrant. Here the highest priority event is displayed first, and the lowest priority event is displayed last. This allows the user to quickly determine which events warrant the most immediate attention.

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

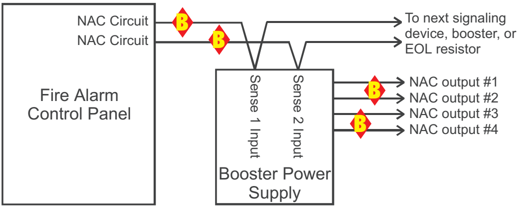
FIREWORKS WIRING DIAGRAM





BOOSTER POWER SUPPLIES

REMOTE BOOSTER POWER SUPPLY



The Remote Booster Power Supply is a self-contained 24 Vdc power supply designed to augment fire alarm audible and visual power requirements. The booster contains all of the necessary circuits to monitor and charge batteries, control and supervise four Class B or two Class A NAC circuits and monitor two controlling inputs from external sources. Simple switch selection provides a wide variety of operational configurations. Each remote booster power supply is supplied with its own enclosure providing ample space for additional interface modules and battery compartment. The BPS is available in either a 6.5 or 10 amp version @ 24 Vdc. The Remote Booster Power Supply provides additional power for audible and visual devices when constrained by system capacity or site application. Fault conditions detected by the BPS will open the main panel's NAC. This initiates a trouble condition and eliminates the need to wire a separate trouble contact back to the control panel. During alarm condition, detected faults are overridden and the main panel's default configuration is restored. The BPS's default output configuration is continuous 24 Vdc on all NACs. This output is typically used to drive visual BPS notification appliance circuits.



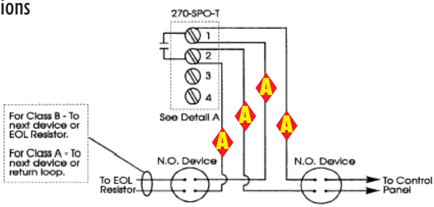
see EST3 reference table on page 22

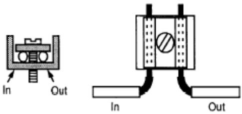
Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

INITIATING DEVICES

INITIATING DEVICES (CONVENTIONAL)

Manual Pull Stations





Metal Manual Pull Stations

270 Series: Single action, break glass. Available with normally open, normally closed or combination NO/NC contacts. 270 Series with screw terminals for field connection. 270A Series with 6-inch wire leads.

270P Series: Break glass, normally open pre-signal station. Screw terminals.



270

Lexan Manual Pull Stations

The **EST 276B/277B** series includes single and double action stations, both available with either terminals or 6" wire leads for field wiring connections. All types can be either pre-signal or general alarm and are available with single or double pole alarm contacts that can be normally open, normally closed or a combination of both.

276B Series: Single action w/ terminals
277B Series: Single action w/ wire leads
278B Series: Double action w/ terminals
279B Series: Double action w/ wire leads



276B/277B



1534-1

Institutional Manual Stations

1534-1: Key-operated Station (deters tampering)

Hazadordous Location Manual Station

XAL-53: rugged double-action fire alarm



XAL-53

INITIATING DEVICES

EC SERIES DETECTORS

Smoke and Heat Detectors

EC30U-3: Low-profile Plug-in Photoelectric Detector for all fire types.
EC20FTU-3: Low-profile Plug-in Fixed Temperature Heat Detector for locations that experience fluctuations in ambient temperature (laundries, industries).
EC20RRU-3: Low-profile Plug-in Rate-of-Rise Heat Detector for locations where ambient temperature is relatively constant but where steam and smoke are present (kitchens, shower rooms).

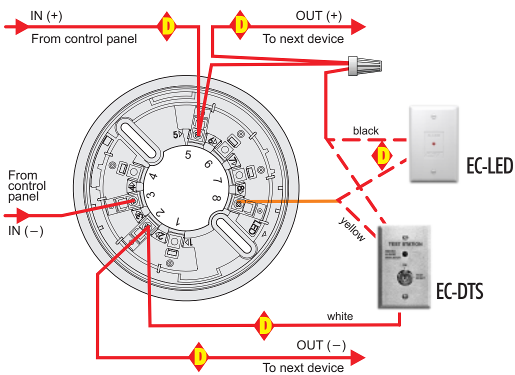
Duct Detector
EC30DU-3: Photoelectric Duct Smoke

Detector Accessories

CSBU-1:	Standard Detector Base
6260A-CU:	Duct Smoke Detector Housing
EC-LED:	Remote Alarm LED
EC-DTS:	Remote LED/Test Station



CSBU-1 wiring to EC-LED or C-DTS



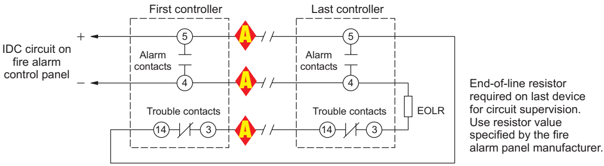
Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

INITIATING DEVICES

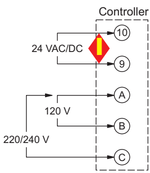
SUPERDUCT

The *SuperDuct* four-wire duct is designed specifically for rooftop HVAC systems. The detector assembly provides easy access to the smoke sensor, its wiring connections, sample and exhaust tube fittings, and the smoke chamber itself. Air enters the assembly by means of an air sampling tube (ordered separately), and exits by means of a six-inch exhaust tube (included).

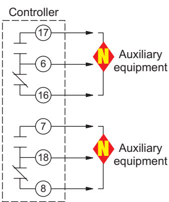




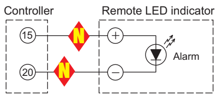
Fire alarm initiating circuit wiring



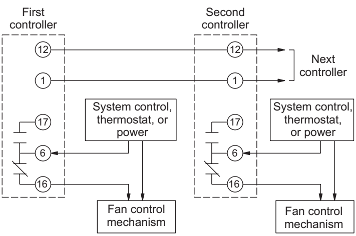
Power input wiring



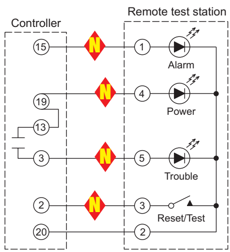
Auxiliary relay wiring



Remote LED indicator wiring



Multiple fan shutdown interconnect wiring



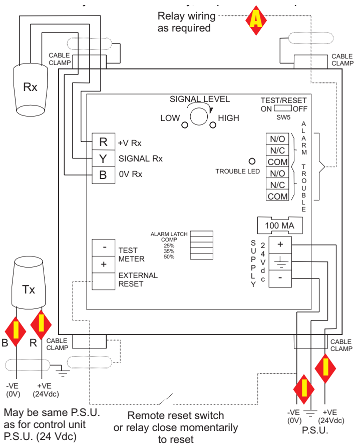
Note: For applications where only the Alarm LED and Reset/Test switch is required, wiring the Power LED and Trouble LED is optional.

Remote test station wiring

INITIATING DEVICES

BEAM DETECTORS

Fireray 200 Beam Detector

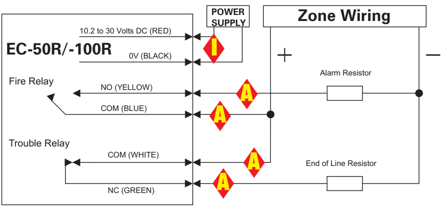




The Fireray 2000 is a projected beam smoke detector designed to detect smoke in a large volume. The system is comprised of three pieces, a transmitter head, a receiver head, and a control box.

Fireray Wiring

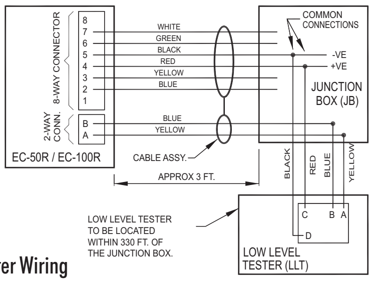
Reflective Beam Smoke Detector (EC-50R/-100R)





Single Zone Wiring

The EC-50R/-100R comprises a transmitter and receiver in a single enclosure and is usually installed between 19 and 24 inches below the ceiling.



Low-level Tester Wiring

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

NOTIFICATION APPLIANCES

GENESIS

Genesis (wall mount) Chimes, Chime-strobes: GC-HVDM

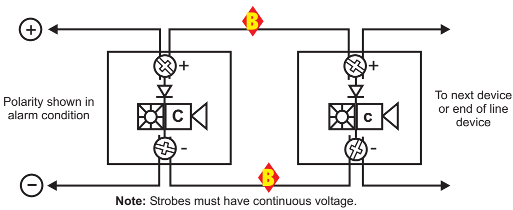


The Genesis line of signals are the smallest, most compact audible-visible emergency signaling devices in the world. Speaker-strobes feature 15, 30, 75 or 110 candela output, selectable with a conveniently-located switch on the bottom of the device. All Genesis strobes self-synchronize when installed with the Genesis Signal Master or SIGA-CC1S module.

Genesis chimes automatically pulse at 60 strokes per minute, when steady (non-stroked) voltage is applied, or may be field-configured for temporal output. When installed with a GIM Signal Master Module, the chime may also be field-configured for coded operation, which enables the chime output to match the rate that voltage is applied to the circuit. Peak output level is 79 dBA (peak). The chime may be set for low dB output with a jumper cut that reduces sound output by about 5 dB.

Models:

G1-CVM	Genesis Chime-Strobe (selectable 15, 30, 75, or 110 cd output, selectable high/low dB output)
G1-C	Genesis Chime (selectable high/low dB output)
G1F-CVM	Genesis Chime-Strobe (selectable 15, 30, 75, or 110 cd output, selectable high/low dB output) – with "FIRE" marking
G1F-C	Genesis Chime (selectable high/low dB output) – with "FIRE" marking
SIGA-CC1S	Intelligent Synchronization Output Module (2-gang)
SIGA-MCC1S	Intelligent Synchronization Output Module (Plug-in UIO)



Chime Wiring

NOTIFICATION APPLIANCES

GENESIS

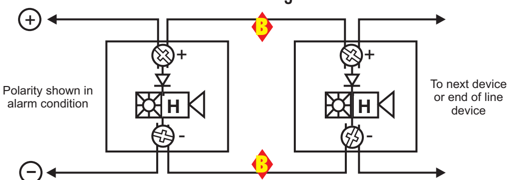
Genesis (ceiling mount) Field Configurable Horns, Strobes, Synchronization module



Models:

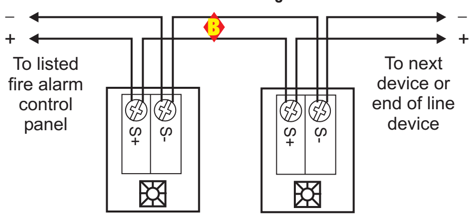
GC-HDVM	Genesis Ceiling/Wall Horn-Strobe (selectable 15, 30, 75, or 95 cd output)
G1M-RM	Genesis Signal Master – Remote Mount (1-gang)
GC-VM	Genesis Ceiling Strobe (selectable 15, 30, 75, or 95 cd output)
GCF-VM	Genesis Ceiling Strobe (selectable 15, 30, 75, or 95 cd output) with FIRE marking.
SIGA- CC1S	Intelligent Synchronization Output Module (2-gang)
SIGA- MCC1S	Intelligent Synchronization Output Module (Plug-in UIO)

Horn Wiring



Note: Strobes must have continuous voltage.

Strobe Wiring



Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

NOTIFICATION APPLIANCES

GENESIS

Genesis (wall mount) Speakers

All Genesis speakers include a DC blocking capacitor to allow electrical supervision of the audio distribution circuit. Models for 25 V_{RMS} and 70 V_{RMS} circuits are available. ¼ W to 2 W operation is selectable with a conveniently-located switch on the bottom of the device.

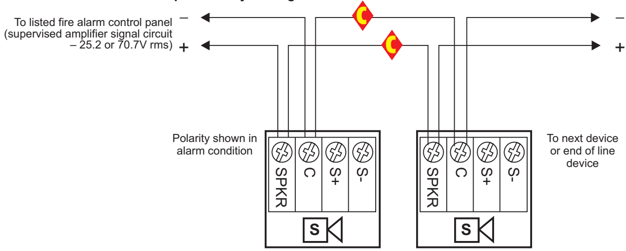




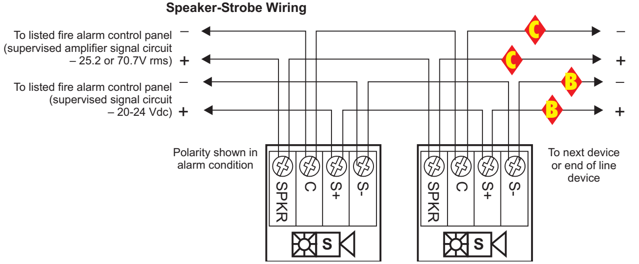
Models:

G4-S2VM	25 Volt Speaker-strobe with selectable 15, 30, 75, or 110 cd output
G4-S7VM	70 Volt Speaker with selectable 15, 30, 75, or 110 cd output
G4-S2	25 Volt Speaker
G4-S7	70 Volt Speaker
G1M-RM	Synchronization Output Module (1-gang)

Speaker-only Wiriing



Speaker-Strobe Wiring



NOTIFICATION APPLIANCES

GENESIS

Genesis (ceiling mount) Field Configurable Speakers and Speaker/Strobes

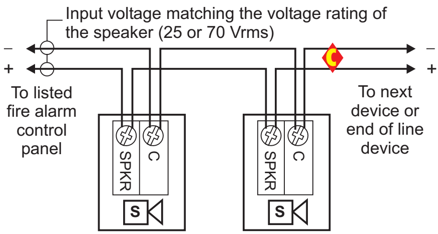


GC-S2 Speaker

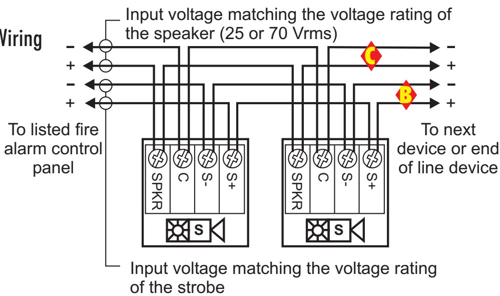


GC-S2VMSpeaker/Strobe

Speaker Wiring



Speaker/Strobe Wiring



Models:

GC-S2VM	25 Volt Speaker-strobe, c/w selectable 15, 30, 75, or 95 cd output
GC-S7VM	70 Volt Speaker-strobe, c/w selectable 15, 30, 75, or 95 cd output
GC-S2	25 Volt Speaker with selectable ¼, ½, 1, or 2 watt taps.
GC-S7	70 Volt Speaker with selectable ¼, ½, 1, or 2 watt taps.

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

NOTIFICATION APPLIANCES

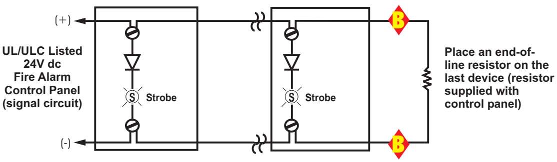
INTEGRITY

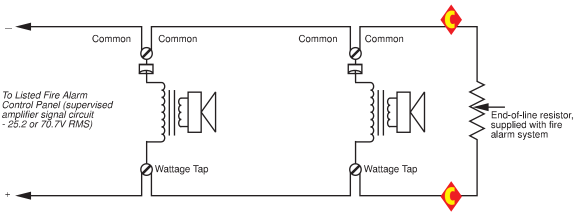
964 and 965 Series Speaker and Speaker/Strobe





These Speakers and Speaker/Strobes are available in either 4 inch or 8 inch size.
964 Series speakers connect to 25 Vrms audio circuits.
965 Series speakers connect to 70 Vrms audio circuits. The strobe must be connected to signal circuits which output a constant (not pulsed) 24 Vdc voltage.





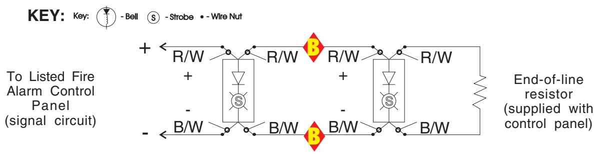
Models (R=round):

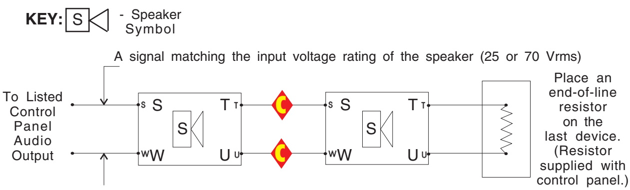
25 volt		70 volt	
964-1A-4R	Speaker	965-1A-4R	Speaker
964-5A-4R	Speaker-Strobe, 15cd	965-5A-4R	Speaker-Strobe, 15cd
964-7A-4R	Speaker-Strobe, 15/75cd	965-7A-4R	Speaker-Strobe, 15/75cd
964-3A-4R	Speaker-Strobe, 30cd	965-3A-4R	Speaker-Strobe, 30cd
964-8A-4R	Speaker-Strobe, 110cd	965-8A-4R	Speaker-Strobe, 110cd

964 and 965 Series Speaker and Speaker/Strobe



These Speakers and Speaker/Strobes are available in either 4 inch or 8 inch size.
964 Series speakers connect to 25 Vrms audio circuits.
965 Series speakers connect to 70 Vrms audio circuits. The strobe must be connected to signal circuits which output a constant (not pulsed) 24 Vdc voltage.





CAUTION: Electrical supervision requires wire run to be broken at each device.

Models (S=square):
964-1A-4S same as those listed on page 49

NOTIFICATION APPLIANCES

INTEGRITY

Synchronized Strobes - 405 Series

405 Series strobes are available with 15 cd, 15/75 cd, 30 cd, 60 cd, and 110 cd effective flash intensity and are fully compatible with Genesis signals.

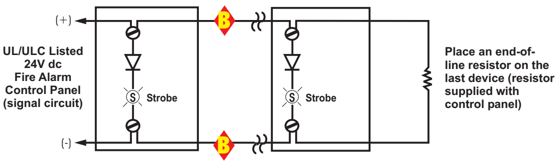


405-5A-T Strobe, 15 cd
405-7A-T Strobe, 15/75
405-3A-T Strobe, 30 cd
405-6A-T Strobe, 60 cd
405-8A-T Strobe, 110 cd

Outdoor Listed Strobes

CS405-7A-T Strobe, 15/75, Outdoor
CS405-8A-T Strobe, 110 cd, Outdoor

Wiring for 405 and 202 Series Strobes



202 Series Mini-strobes

202 Series strobes are available with 15/75 cd, and 110 cd effective flash intensity. They are fully compatible with Genesis signals.



202-7A-T Strobe - 15/75 cd
202-8A-T Strobe - 110 cd
203-8A-T Strobe - 110 cd, 120 Vac

NOTIFICATION APPLIANCES

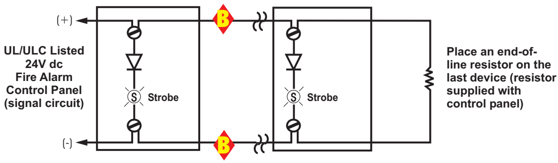
INTEGRITY

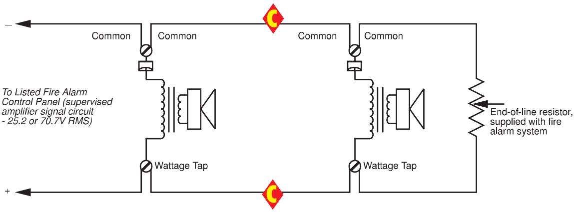
757 Series Speaker Strobes





Integrity strobes synchronize to the latest UL 1971 requirements when used with an external control module (G1M or SIGA-CC1S). High efficency speaker produces a loud 90 dBA at 2 watts. Easy to select for ¼, ½, 1, or 2 watt operation. Integrity speakers are supplied with a DC Blocking Capacitor for audio circuit supervision.





25 Volt Speaker		70 Volt Speaker	
757-1A-S25	Speaker	757-1A-S70	Speaker
25 Volt Speaker/Strobes		**70 Volt Speaker/Strobes**	
757-5A-SS25	Speaker-Strobe, 15cd	757-5A-SS70	Speaker-Strobe, 15cd
757-7A-SS25	Speaker-Strobe, 15/75cd	757-7A-SS70	Speaker-Strobe, 15/75cd
757-3A-SS25	Speaker-Strobe, 30cd	757-3A-SS70	Speaker-Strobe, 30cd
757-8A-SS25	Speaker-Strobe, 110cd	757-8A-SS70	Speaker-Strobe, 110cd

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

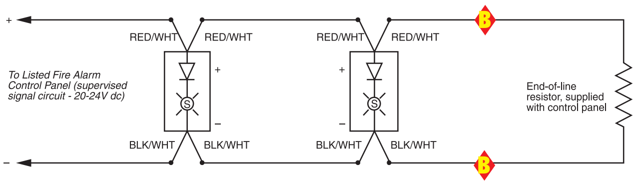
NOTIFICATION APPLIANCES

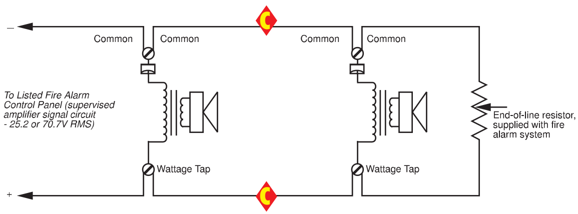
INTEGRITY

757 Series Re-entrant Speaker and Speaker /Strobes (outdoor use)









25 Volt Re-Entrant Speakers
757-1A-R25 Speaker

25 Volt Re-Entrant Speakers/Strobes
757-7A-RS25 Speaker-Strobe, 15/75cd
757-3A-RS25 Speaker-Strobe, 30cd
757-8A-RS25 Speaker-Strobe, 110cd

70 Volt Re-Entrant Speakers
757-1A-R70 Speaker

70 Volt Re-Entrant Speakers/Strobes
757-7A-RS70 Speaker-Strobe, 15/75cd
757-3A-RS70 Speaker-Strobe, 30cd
757-8A-RS70 Speaker-Strobe, 110cd

NOTIFICATION APPLIANCES

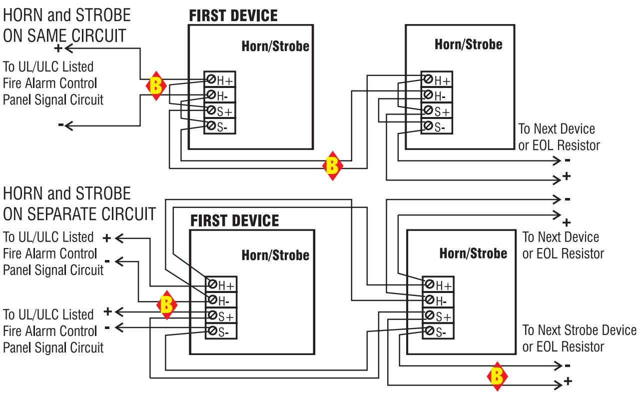
INTEGRITY

757 Series Temporal Horn and Horn-strobe





Integrity strobes synchronize to the latest UL 1971 requirements when used with an external control module (G1M or SIGA-CC1S). Audible output is adjustable - select temporal or continuous tones, and High setting for 98 dBA output or Low setting for 94 dBA sound output.



Models

757-1A-T Temporal Horn
757-7A-T Temporal Horn-Strobe, 15/75cd
757-8A-T Temporal Horn-Strobe, 110cd

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

NOTIFICATION APPLIANCES

HAZARDOUS LOCATION NOTIFICATION APPLIANCES



Weather/Explosion proof heat detectors
Series 500 heat sensors are designed for use in applications requiring protection against weather, moisture (internal condensation), and explosive atmospheres. Heat sensors are normally-open devices designed to close an electrical circuit upon activation. Sensors use dual action, electric fire detection thermostats that employ two independent methods of detection: rate-of-rise and fixed temperature.



Hazardous Location, Weatherproof Strobes
106DEX hazardous location strobes are diode polarized life safety signaling appliances designed for installation in hazardous environments.

Hazardous Location Multiple Tone Signals
EST 5533BD signals are heavy-duty industrial, tone-selectable, signaling devices capable of producing volume-controlled, high-decibel tones. The signals accept up to two contact closures and deliver two audible output signals selected from the 19 available tones.



Hazardous Location Horns and Sirens
The 5522D-AW (Horn) and the 5523D-AW (Siren) are extremely high decibel, high-performance diode-polarized signaling appliances intended for fire alarm and life safety applications. The signals operate with very low current consumption and do not require extra current on start-up.



Hazardous Location Bells
430D series: diode-polarized, heavy duty fire bells for use in life safety applications where a diode supervised signal is required.



Hazardous Location Horns
888D and 889D: diode-polarized, heavy duty, high decibel vibrating horns intended for use in life safety systems in hazardous (classified) locations.

SIGNATURE MODULES

MANUAL PULL STATION WITH MODULE

270 Series Series One- and Two-stage Pull Stations

SIGA-270	One Stage Fire Alarm Station
SIGA-270P	Two Stage (Presignal) Fire Alarm Station
SIGA-278	Double Action (One Stage) Fire Alarm Station

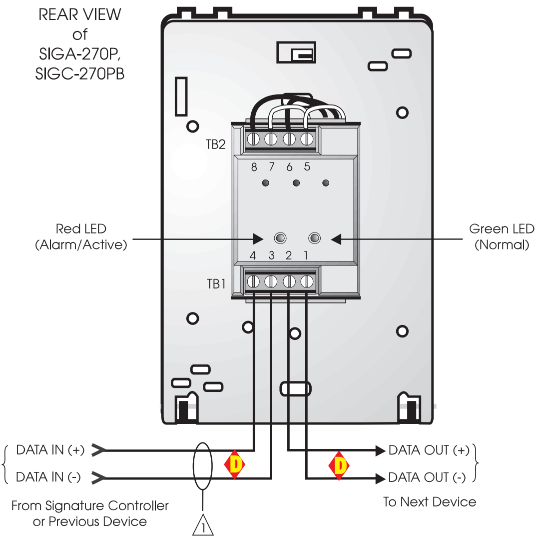


SIGA-278



SIGA-270

Note: Wiring is the same for both the SIGA-270 and the SIGA-278



Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

SIGNATURE MODULES

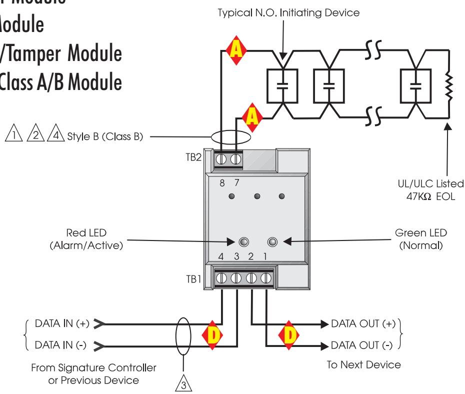
FIRE INPUT MODULES (GANG MOUNT)

SIGA-CT1, SIGA-CT2, SIGA-WTM, SIGA-MM1, SIGA-UM

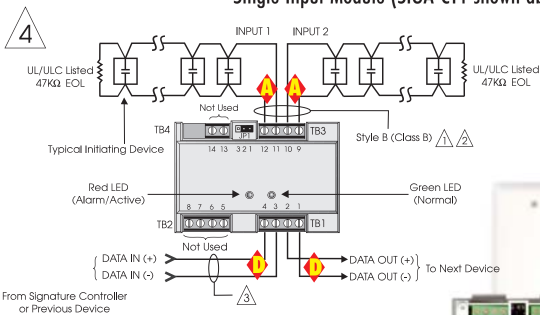
Modules are intelligent analog addressable devices used to connect one or two Class B normally-open Alarm, Supervisory, or Monitor type dry contact Initiating Device Circuits (IDC). Models:

SIGA-CT1	Single Input Module
SIGA-CT2	Dual Input Module
SIGA-MM1	Monitor Module
SIGA-WTM	Waterflow/Tamper Module
SIGA-UM	Universal Class A/B Module





Single Input Module (SIGA-CT1 shown above)





SIGA-UM Class B Dual Input Module
(CT-2 wiring shown above)

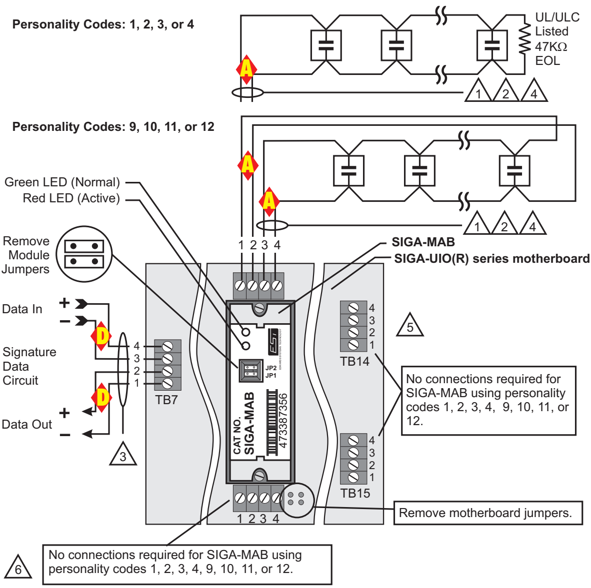
SIGNATURE MODULES

FIRE INPUT MODULES (UIO MOUNT)

Input Modules SIGA-UIO (2R/6/6R), MCT1, MCT2, MAB

SIGA-UIO2R	Universal Input-Output Module Board w/Riser Inputs — Two Module Positions
SIGA-UIO6R	Universal Input-Output Module Board w/Riser Inputs — Six Module Positions
SIGA-UIO6	Universal Input-Output Module Board — Six Module Positions
SIGA-MCT2	Dual Input Plug-in (UIO) Module
SIGA-MAB	Universal Class A/B Module (Plug-in)





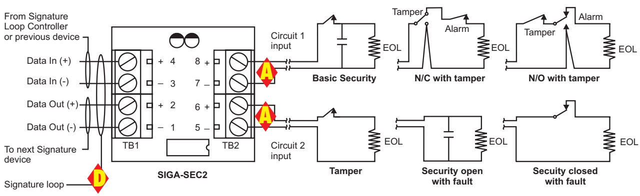
SIGNATURE MODULES

SECURITY INPUT MODULES

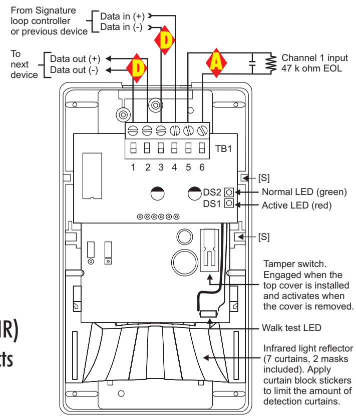
Input Modules SIGA-SEC-2, SIGA-MD

The SIGA-SEC2 Dual Input Security Module is an intelligent analog addressable device used to connect one or two normally-open or normally-closed dry contact security circuits.









The SIGA-MD is a Passive Infrared (PIR) motion detection module that connects directly to the Signature loop.

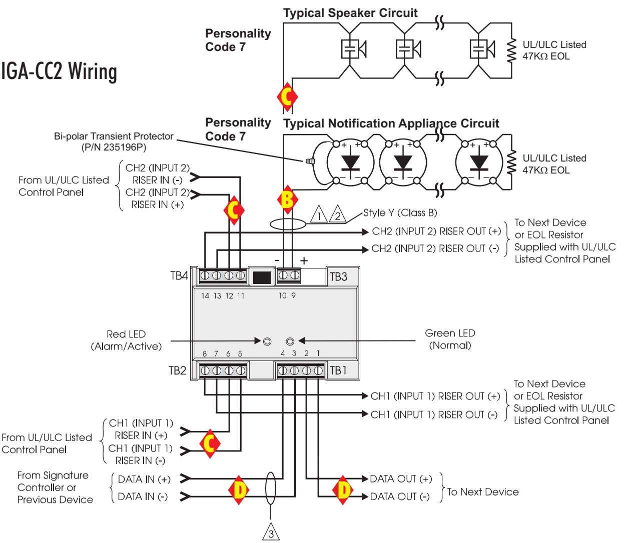
OUTPUT MODULES (GANG MOUNT)



The SIGA-UM Universal Class A/B Module is installed to a standard North American 2-gang electrical box. Separate I/O and data loop connections are made to each module. The SIGA-UM may be used to connect any one of the following: two Class B or one Class A Initiating Device Circuits; one Class A or B Notification Appliance Circuit; one Class A or B Circuit for 2-wire Smoke Detectors; one Form "C" (NO/NC) Dry Output Contact Relay.

SIGA-CC1 Single Input Signal Modules and SIGA-CC2 Dual Input Signal Modules are used for connecting, upon command from the loop controller, supervised Class B signal or telephone circuits to their respective power inputs. The power inputs may be polarized 24 Vdc to operate audible and visible signal appliances or 25 and 70 VRMS to operate audio evacuation speakers and firefighter's telephones. The actual operation of the SIGA-CC1 and SIGA-CC2 is determined by the "personality code" selected by the installer.

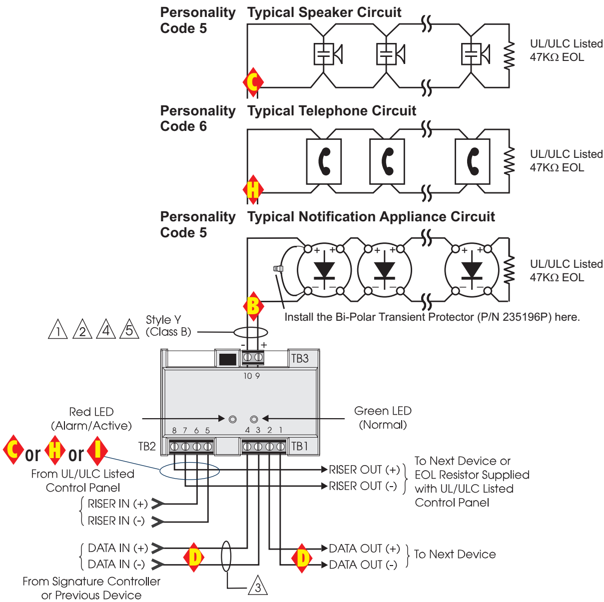
SIGA-CC2 Wiring



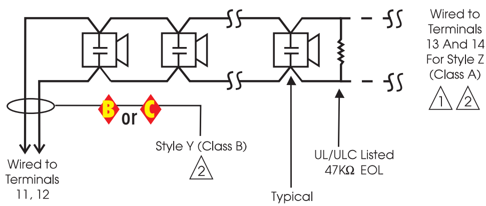
SIGNATURE MODULES

OUTPUT MODULES (GANG MOUNT)

SIGA-CC1 Wiring



SIGA-UM Single Output Module (Personality Code 15 or 16)



Typical Speaker Circuit (Personality Code 15)

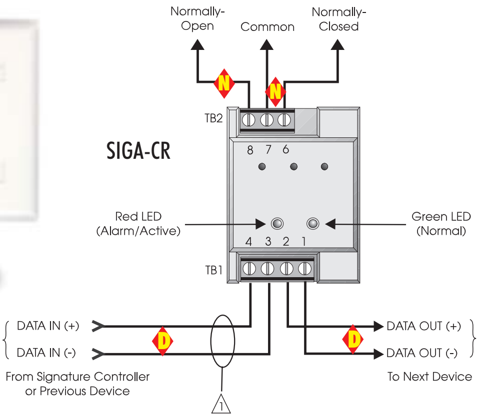
OUTPUT MODULES (GANG MOUNT)

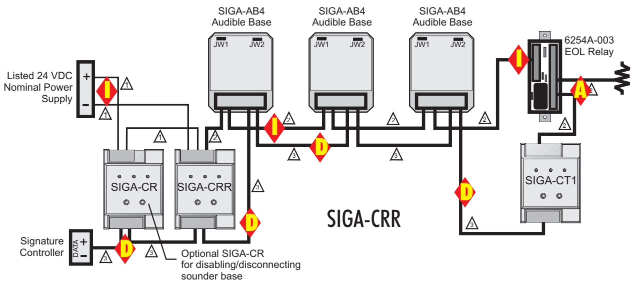
SIGA-CR Control Relay, SIGA-CRR Polarity Reversal Relay Modules

The SIGA-CR Control Relay Module provides a Form "C" dry relay contact to control external appliances such as door closers, fans, dampers etc. This device does not provide supervision of the state of the relay contact. Instead, the on-board microprocessor ensures that the relay is in the proper ON/OFF state. Upon command from the loop controller, the relay activates the normally open or normally-closed contact.

The SIGA-CRR Polarity Reversal Relay Module provides a Form "C" dry relay contact to power and activate a series of SIGA-AB4 Audible Sounder Bases. Upon command from the Signature loop controller, the SIGA-CRR reverses the polarity of its 24 Vdc output, thus activating all Sounder Bases on the data loop.







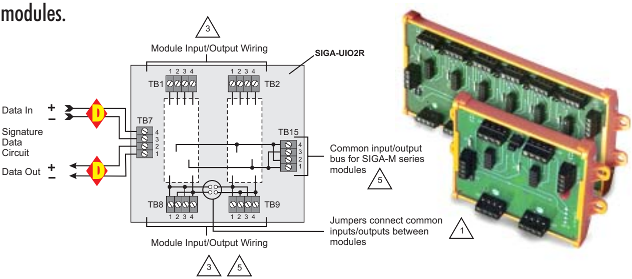
Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

SIGNATURE MODULES

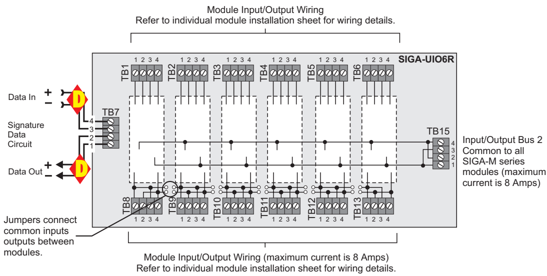
OUTPUT MODULES (UIO MOUNT)

Universal Input/Output Module Motherboards

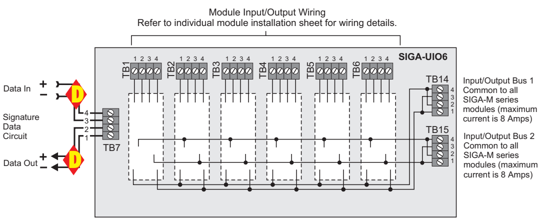
Signature Series Universal Input-Output Module Motherboards provide mounting and wiring terminations for up to six Signature Series plug-in UIO (SIGA-"M" series) modules.



SIGA-UIO2R Universal Input-Output Module Board w/Riser Inputs - Two Module Positions



SIGA-UIO6R Universal Input-Output Module Board w/Riser Inputs - Six Module Positions



SIGA-UIO6 Universal Input-Output Module Board - Six Module Positions

SIGNATURE MODULES

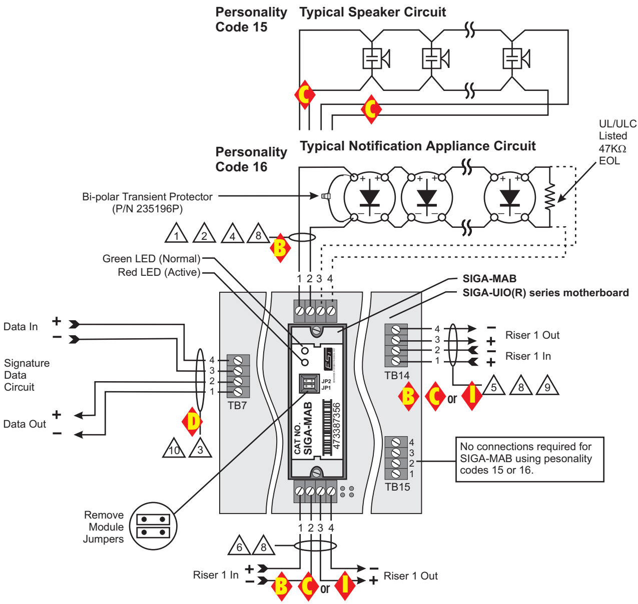
OUTPUT MODULES (UIO MOUNT)

SIGA-MAB



The SIGA-MAB is a Universal Class A/B Module that takes advantage of the modular flexibility and easy installation that characterizes all UIO modules. Two- and six-module UIO motherboards are available. These can accommodate individual risers for each on-board module, or shared risers in any combination with their UIO modules. All wiring connections are made to terminal blocks on the motherboard. UIO assemblies may be mounted in EST enclosures. The SIGA-MAB may be used to connect any one of the following:

- one Class B or one Class A Initiating Device Circuit
- one Class A or B Notification Appliance Circuit



Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

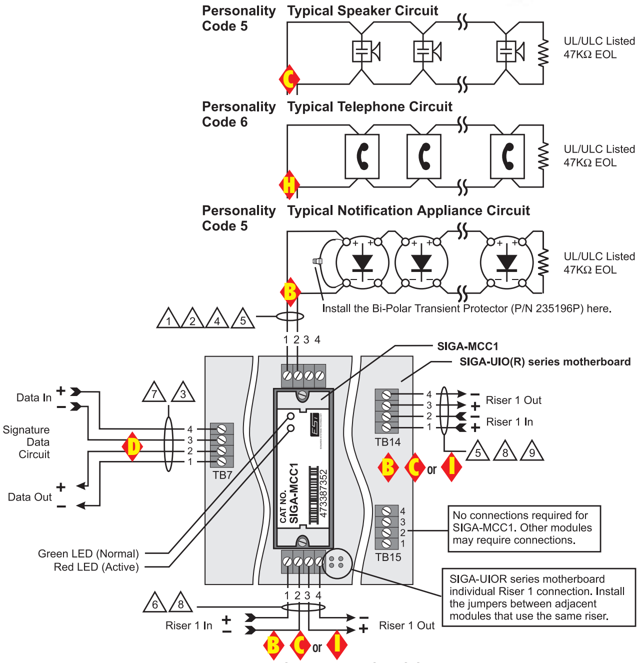
SIGNATURE MODULES

OUTPUT MODULES (UIO MOUNT)

SIGA-MCC1/MCC2

SIGA-MCC1 Single Input Signal Modules and SIGA-MCC2 Dual Input Signal Modules are intelligent analog addressable devices used for connecting, upon command from the loop controller, supervised Class B signal or telephone circuits to their respective power inputs. The power inputs may be polarized 24 Vdc to operate audible and visible signal appliances or 25 and 70 VRMS to operate audio evacuation speakers and firefighter's telephones.



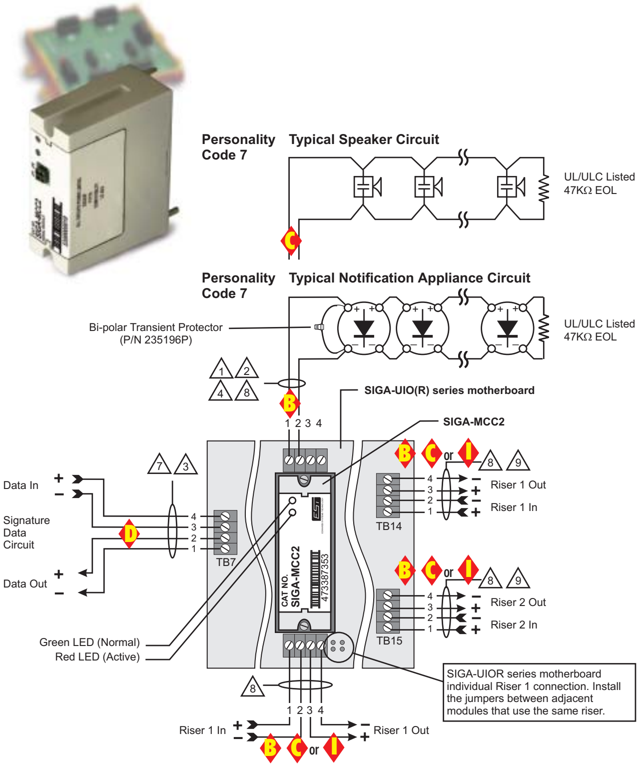


SIGA-MCC1 Single Input Signal Module
(see page 64 for wiring SIGA-MCC2)

SIGNATURE MODULES

OUTPUT MODULES (UIO MOUNT)

SIGA-MCC2 Wiring



SIGA-MCC2 Dual Input Signal Module

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

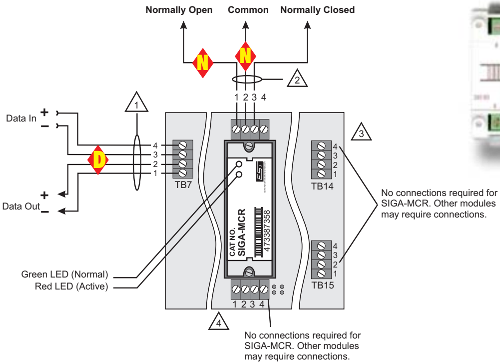
SIGNATURE MODULES

OUTPUT MODULES (UIO MOUNT)

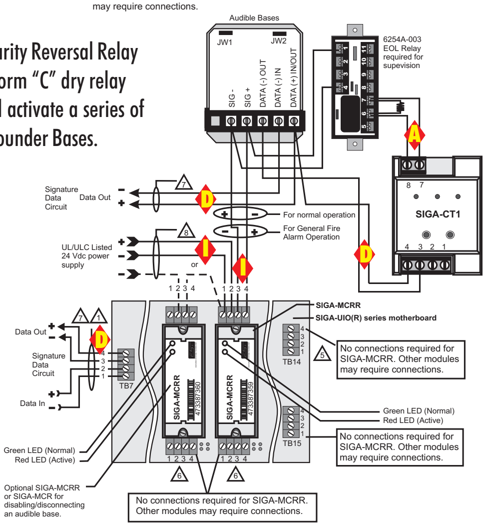
SIGA-MCR/MCRR



The SIGA-MCR Control Relay Module provides a Form “C” dry relay contact to control external appliances such as door closers, fans, dampers etc.



The SIGA-MCRR Polarity Reversal Relay Module provides a Form “C” dry relay contact to power and activate a series of SIGA-AB4 Audible Sounder Bases.

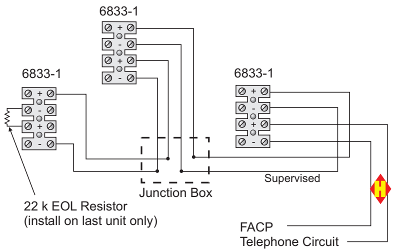


FIREMEN'S TELEPHONE/WARDEN STATION

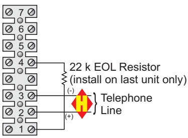
Firemen's Telephones



6833-1 Portable Handset Receptacle

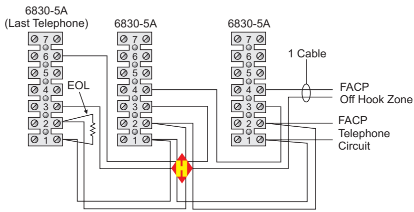


6830-1 Telephone Handset





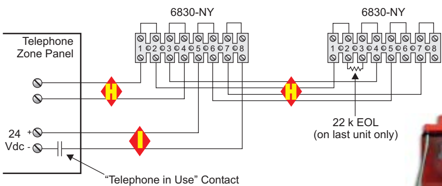
6830-5A Telephone Handset



Note: Use of "Off Hook" Terminals 3, 4, and 6 are for NFPA 72, 3-state operation (IRC-3 and FCC only).

When using multiple handsets on a common telephone circuit, the Off Hook zone is to be wired in series using terminals 3 and 4 with the last handset wired using terminal 3 and 6 as illustrated.

6830-NY Warden Station





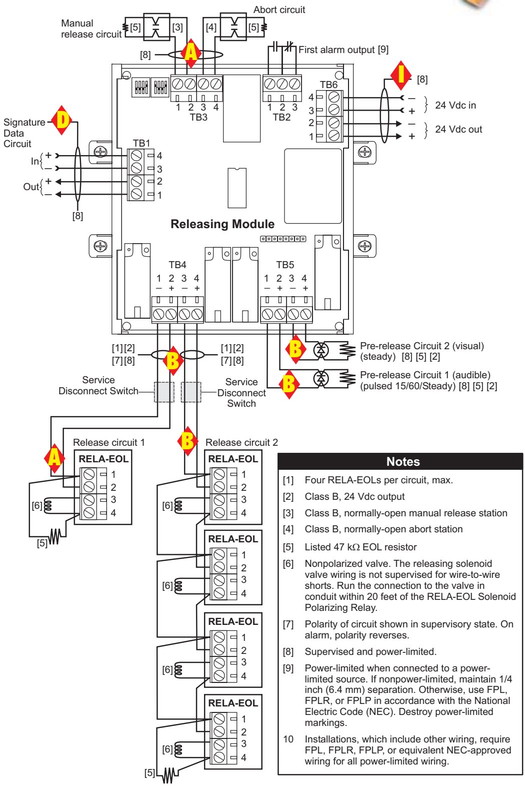
Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

RELEASING MODULE

SIGA-REL



The SIGA-REL is an analog addressable module that communicates directly with the fire alarm panel Signature loop controller. The SIGA-REL controls sprinkler, pre-action and deluge systems, and may also be used to release extinguishing agents such as CO_2, Halon, or foam.



Notes

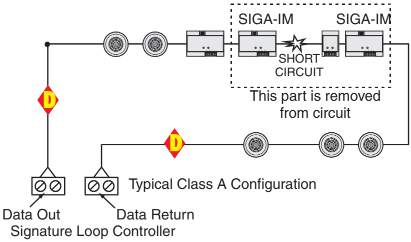
- [1] Four RELA-EOLs per circuit, max.
- [2] Class B, 24 Vdc output
- [3] Class B, normally-open manual release station
- [4] Class B, normally-open abort station
- [5] Listed 47 kΩ EOL resistor
- [6] Nonpolarized valve. The releasing solenoid valve wiring is not supervised for wire-to-wire shorts. Run the connection to the valve in conduit within 20 feet of the RELA-EOL Solenoid Polarizing Relay.
- [7] Polarity of circuit shown in supervisory state. On alarm, polarity reverses.
- [8] Supervised and power-limited.
- [9] Power-limited when connected to a power-limited source. If nonpower-limited, maintain 1/4 inch (6.4 mm) separation. Otherwise, use FPL, FPLR, or FPLP in accordance with the National Electric Code (NEC). Destroy power-limited markings.
- 10 Installations, which include other wiring, require FPL, FPLR, FPLP, or equivalent NEC-approved wiring for all power-limited wiring.

SIGNATURE MODULES

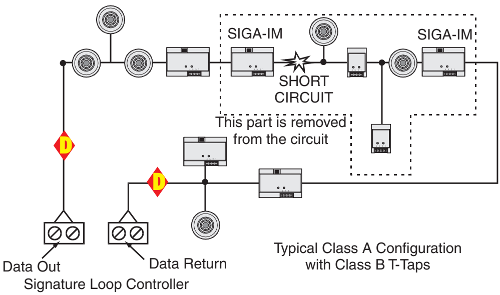
MODULE (TWO-GANG STANDARD MOUNT)

SIGA-IM Fault Isolator Module

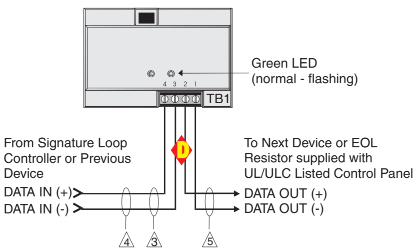
The SIGA-IM Isolator Module enables part of the Signature data loop to continue operating should a short circuit occur. The module can be wired into a Class A data loop at any point.







1. For maximum wire resistance, refer to the appropriate manufacturer's documentation.
2. Max. #12 AWG (2.5mm²)wire.
3. Refer to Signature Loop Controller Installation Sheet for wiring specifications.
4. This module should be used only with Class A wiring.
5. Maximum circuit resistance between isolators is 6 ohms.
6. All wiring is power-limited and supervised.



Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

SIGNATURE MODULES

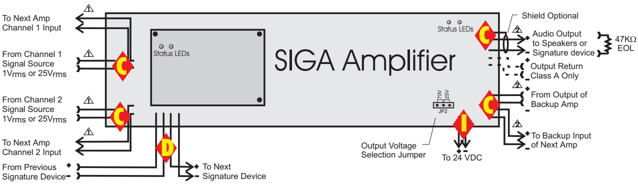
AUDIO AMPLIFIERS AND POWER SUPPLY

SIGA-AA (30, 50) Intelligent Audio Amplifiers

SIGA amplifiers are high efficiency switch mode audio amplifiers available in 30 and 50 watt sizes:

SIGA-AA30 30 Watt Amplifier
SIGA-AA50 50 Watt Amplifier

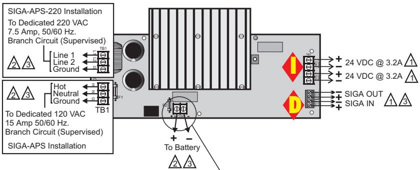


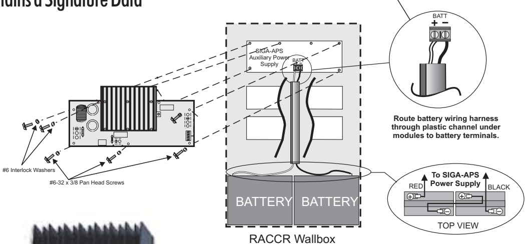


⚠ Twisted-Shielded Pair Wire
⚠ One Twisted Pair Wire, Shield optional

Intelligent Auxiliary Power Supply

The SIGA-APS power supply is a switch mode supply that provides additional power for any Fire Alarm Control Panel that contains a Signature Data Circuit.







Notes

1. Power Limited
2. Non-Power Limited
3. Supervised
4. Power Limited and Non-Power Limited wiring must be separated. Refer to product installation instructions.

SIGNATURE SERIES

DETECTORS

Intelligent Multisensor Detectors

Signature Series Intelligent Multisensor Detectors gather analog information from their smoke sensing elements and convert it into digital signals. Each detector's on-board microprocessor measures and analyzes these signals and compares the information to historical readings and time patterns to make an alarm decision. Digital filters remove signal patterns that are not typical of fires.



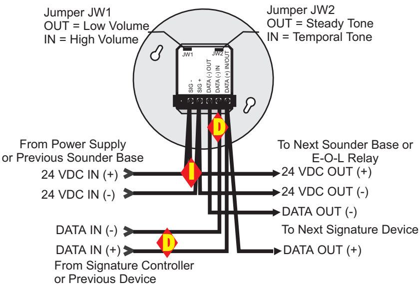
SIGA-IS Intelligent Ionization Smoke Detector: single smoke sensing element.
SIGA-PS Intelligent Photoelectric Smoke Detector: single smoke sensing element.
SIGA-PHS Intelligent 3D Multisensor Detector: two fire sensing elements (photoelectric and heat).
SIGA-IPHS Intelligent 4D Multisensor Detector: three fire sensing elements (ionization, photoelectric, and heat).
SIGA-HFS and SIGA-HRS Intelligent Heat Detectors gather analog information from their fixed temperature and/or rate-of-rise heat sensing elements and converts it into digital signals.

Available bases:

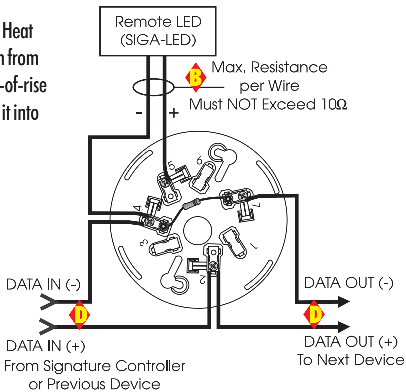
SIGA-SB(4) Standard Base
SIGA-AB4G Audible Sounder Base
(wiring shown on this page)

SIGA-RB(4) Relay Base
SIGA-IB(4) Isolator Base
(wiring shown on page 69)

Sounder Base Wiring



Standard Base Wiring



Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

DUCT DETECTORS

SIGA-DMP Duct Detector Mounting Plate
SIGA-DH Duct Detector Housing

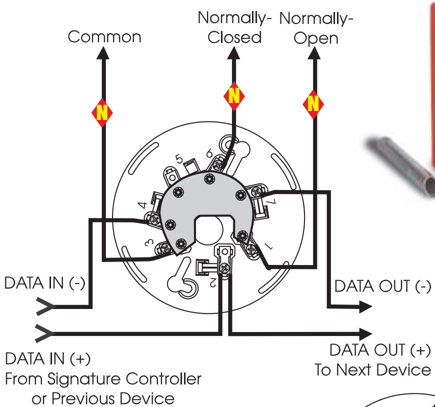


SIGA-DMP

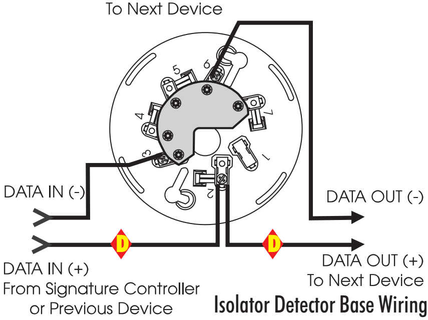
Provides convenient mounting of Signature Series intelligent smoke detectors in ducts, raised floor or plenum applications. The 7-inch plate may also be installed in low velocity ducts with a maximum width of 36 inches and a maximum height of 36 inches. Includes a 4-inch square junction box for wiring connections. Compatible with the following: SIGA-PS, SIGA-PHS, SIGA-IPHS, SIGA-SB Standard Base, SIGA-RB Relay Base, SIGA-IB Isolator Base.



SIGA-DH



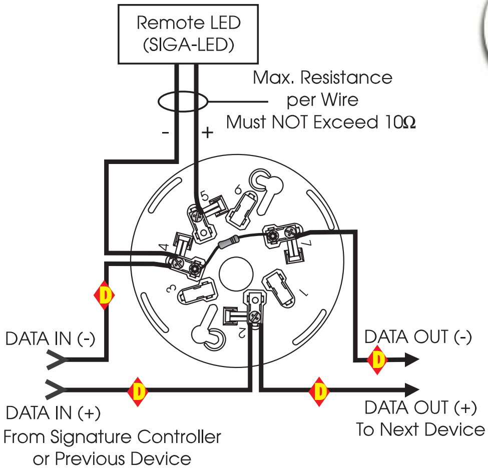
Relay Detector Base Wiring



Isolator Detector Base Wiring

DETECTOR ACCESSORIES

Wiring: Standard Detector Base to SIGA-LED



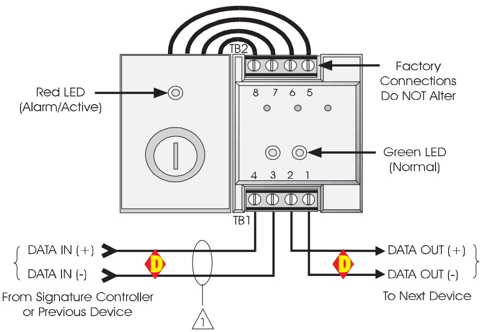


Standard Base



SIGA-LED

Wiring: Duct Detector Test Station SIGA-DTS





SIGA-DTS

Diagrams are for reference only.
Consult the appropriate installation sheet for wiring details.

24 VDC NAC WIRE LENGTH

General Information

The 24 Vdc notification appliance circuits must be a minimum of 18 AWG (0.75 mm^2) pair. Terminals on FireShield, QuickStart and EST3 will support 18-12 AWG wire. Circuit length limits are determined using the maximum allowable circuit resistance and cable manufacturer's specifications.

Circuit capacity

FireShield notification appliance circuits are rated at 1.5 amps each at 24 Vdc FWR.
QuickStart notification appliance circuits are rated at 1 or 2 amps each at 24 Vdc FWR.
EST3 notification appliance circuits are rated at 3.5 amps each at 24 Vdc regulated.

Table A-1: Wire resistance ratings to use for wire length calculations

Wire Size	Resistance per 1000 ft pair (ohms)
18 AWG / (0.75 mm^2)	13.0
16 AWG / (1.0 mm^2)	8.0
14 AWG / (1.50 mm^2)	5.2
12 AWG / (2.5 mm^2)	3.5

24 VDC NAC WIRE LENGTH

NAC Voltage Drop Calculations

Notification appliance circuit voltage drop calculation

Circuit length		Total circuit current [2]		Wire resistance per 1000 ft [1]		Voltage drop
feet	x	amps	x	Ohms	÷ 1000 =	

Panel voltage		Voltage drop		End of line voltage [3]
[4]	-		=	

Voltage drop		Panel voltage		Voltage drop %
	÷	[4]	=	

FireShield voltage drop calculation notes

[1] Use wire resistance from Table 1.

[2] Use the *20 Vdc VFWR Average/Mean Operating Current* ratings found on the installation or catalog sheet of each device.

[3] Cannot drop below 17 Vdc.

[4] 18.6 V for 230 V at 50 Hz, 18.8 V for 230 V at 60 Hz, 18.9 V for 120 V at 60 Hz

QuickStart voltage drop calculation notes

[1] Use wire resistance from Table 1.

[2] Use the *20 Vdc VFWR Average/Mean Operating Current* ratings found on the installation or catalog sheet of each device.

[3] Cannot drop below 17 Vdc.

[4] 17.5 Vdc

EST3 voltage drop calculation notes

[1] Use wire resistance from Table 1.

[2] Use the *20 Vdc Average/Mean Operating Current* ratings found on the installation or catalog sheet of each device.

[3] Cannot drop below 17 Vdc.

[4] 21.4 Vdc

Note: Due to expected changes by UL the calculations on these two pages and the load currents for all audio and visual devices are expected to be revised by the end of 2005.

24 VDC NAC WIRE LENGTH

Notification appliance circuit maximum wire length calculation

Use this worksheet to determine the maximum wire length of a notification appliance circuit. Fill in one worksheet for each NAC connected to the panel.

Maximum signal loss allowed [1]		[ ]	V
	x	1000	
		[ ]	
Wire resistance per 1000 ft/pair [2]	÷	[ ]	ohms
		[ ]	
Total operating current required [3]	÷	[ ]	A
Maximum circuit length		[ ]	ft

FireShield maximum wire length calculation notes

[1] 1.6 V for 230 V at 50 Hz, 1.8 V for 230 V at 60 Hz, 1.9 V for 120 V at 60 Hz

[2] Use wire resistance from Table 1.

[3] Use the *20 Vdc VFWR Average/Mean Operating Current* ratings found on the installation or catalog sheet of each device.

QuickStart maximum wire length calculation notes

[1] For worst case estimates, assume a 1.5 V line loss and all appliances are clustered at the end of the circuit.

[2] Use wire resistance from Table 1.

[3] Use the *20 Vdc VFWR Average/Mean Operating Current* ratings found on the installation or catalog sheet of each device.

EST3 maximum wire length calculation notes

[1] For worst case estimates, assume a 3.4 V line loss and all appliances are clustered at the end of the circuit.

[2] Use wire resistance from Table 1.

[3] Use the *20 Vdc Average/Mean Operating Current* ratings found on the installation or catalog sheet of each device.

25 OR 70 VRMS NAC WIRE LENGTH

25 Vrms or 70 Vrms NAC wire length

The maximum allowable wire length is the farthest distance that a pair of wires can extend from the amplifier to the last speaker on the notification appliance circuit without losing more than 0.5 dB of signal. Calculating the maximum allowable wire length using this method ensures that each speaker operates at its full potential.

Several factors influence the maximum allowable wire length:

- Wire size
- Output signal level of the amplifier driving the circuit
- Number of speakers installed on the circuit

To calculate the maximum allowable wire length for a 0.5 dB loss, use the following formula:

$$\text{Max. length} = \frac{59.25 \text{ x Amplifier Output}^2}{\text{Wire Resistance x Circuit Load}}$$

where:

- Amplifier output is the signal level in Vrms supplied by the amplifier driving the circuit
- Circuit load is the total watts required by the audio circuit
- Wire resistance is the resistance rating of the wire per 1000 ft pair, see Table.

For example, the maximum allowable wire length for an audio circuit consisting of a 40 W, 25 Vrms amplifier driving thirty 1-watt speakers, using 18-guage wire would be 95 ft.

$$94.95 = \frac{59.25 \text{ x } 25}{13 \text{ x } 13}$$

B-1 and B-2 gives the maximum allowable wire lengths for various wire sizes and loads. Use B-1 when designing circuits for amplifiers set for 25 Vrms output. Use B-2 when designing circuits for amplifiers set for a 70 Vrms output.

25 OR 70 VRMS NAC WIRE LENGTH

B-1: Maximum allowable length at 25 Vrms, 0.5 dB loss

Wire Size	Circuit Load Requirement											
	15 W		20 W		30 W		40 W		90 W		120 W	
	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
18 AWG ($0.75\ mm^2$)	190	58	142	43	95	29	71	22	Over max current limit		Over max current limit	
16 AWG ($1.0\ mm^2$)	309	94	231	70	154	47	116	35	51	16	39	12
14 AWG ($1.5\ mm^2$)	475	145	356	109	237	72	178	54	79	24	59	18
12 AWG ($2.5\ mm^2$)	772	235	579	176	386	118	289	88	129	39	96	29

B-2: Maximum allowable length at 70 Vrms, 0.5 dB loss

Wire Size	Circuit Load Requirement											
	15 W		20 W		30 W		40 W		90 W		120 W	
	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
18 AWG ($0.75\ mm^2$)	1489	454	1117	340	744	227	558	170	248	76	186	57
16 AWG ($1.0\ mm^2$)	2420	738	1815	553	1210	369	907	276	403	123	302	92
14 AWG ($1.5\ mm^2$)	3722	1134	2792	851	1861	567	1396	426	620	189	465	142
12 AWG ($2.5\ mm^2$)	6049	1844	4537	1383	3024	922	2268	691	1008	307	756	230

SIGNATURE DATA CIRCUIT MAXIMUM WIRE LENGTH CALCULATIONS

QS1, QS4 and EST3

Circuit resistance and capacitance determines the maximum length of a Signature data circuit. Circuit resistance affects the wire length of the longest circuit branch. Circuit capacitance affects the total amount of wire that can be used on the circuit. Note: The design of the Signature data circuit must not exceed either of the two measurements.

There are no restrictions placed on the wiring used for the Signature data circuit. Longer wire runs may be obtained using standard (non-twisted, non-shielded) wire pairs.

Several factors influence the maximum allowable branch length:

- Wire gauge and type
- Number of Signature detectors and modules installed on the branch
- Number of SIGA-UMs configured for 2-wire smoke detectors installed on the branch

Determining the maximum allowable branch length

The maximum branch length is the wire distance measured from the Signature controller module to the last device on the longest circuit path as shown on the next page.

To determine the maximum allowable length of a Signature data circuit branch:

1. Identify the device located farthest from the Signature controller.
2. Determine the number of Signature detectors, modules, and SIGA-UMs configured for 2-wire smokes that lie on the same conductive path between the device identified in step 1 and the Signature controller.
3. Calculate the number of detector and module addresses. Some Signature modules require two addresses.
4. Determine the size of the wire used to construct the circuit.
5. Find the maximum allowable wire distance for the longest branch in the lookup tables as follows:
   If no SIGA-UMs are installed, use Table C-2
   If 1–5 SIGA-UMs are installed, use Table C-3
   If 6–10 SIGA-UMs are installed, use Table C-4
   If 11–15 SIGA-UMs are installed, use Table C-5

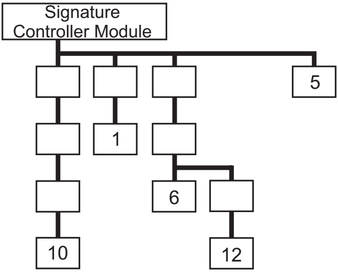
REFERENCE SECTION

SIGNATURE DATA CIRCUIT MAXIMUM WIRE LENGTH CALCULATIONS

Use this worksheet to determine the maximum amount of wire you can use to construct a Signature loop.

Step 1: Calculate the total amount of wire you can used based on the cable manufacturer's capacitance per foot rating. Total amount of wire shall not exceed the values listed in Table .

Determining the total loop length
The total loop length is the sum of the lengths of all the wire segments installed in the data circuit.



The total length of all the cable installed in the Signature data circuit can not exceed the values listed below:

Table C-1: Maximum amount of wire you can use to construct a Signature loop

	Wire Size		
Wire type	14 AWG	16 AWG	18 AWG
Twisted pair	13,157 ft (4,010 m)	13,888 ft (4,233 m)	20,000 ft (6,096 m)
Twisted-shielded pair	5,952 ft (1,814 m)	6,098 ft (1,859 m)	8,621 ft (2,628 m)
Non-twisted, non-shielded pair	20,000 ft (6,096 m)	20,000 ft (6,096 m)	20,000 ft (6,096 m)

If the cable manufacturer's data indicates the capacitance per foot of the cable, the following method may be used to determine the maximum total loop length.

Note: In no case may the total loop length of a Signature data circuit exceed 20,000 feet (6,098 meters).

SIGNATURE DATA CIRCUIT MAXIMUM WIRE LENGTH CALCULATIONS

$$L_{Max} = \frac{500{,}000}{C_{pf/F}}$$

where: L_{Max} = maximum total cable length in feet
$C_{pf/Ft}$ = Cable capacitance in picofarads per foot

Note: A short circuit on a Signature data circuit can disable the entire circuit. In order to limit the effect of a single short circuit on the SDC, SIGA-IB Isolator Bases or SIGA-IM Isolator modules can be installed at strategic points in the circuit.

Step 2: Use Tables C-2, C-3, C-4, and C-5 to determine the longest allowable circuit path based on wire size and type, and the number of detector, module, SIGA–UMs or –MABs installed on the loop.

In the illustration below, the longest circuit path (shown in bold lines) is 1240 ft (377.95 m). The total amount of wire comprising the loop is 1740 ft (530.35 m).

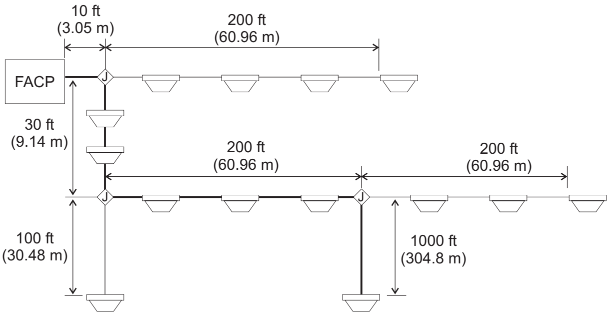


Table C-2 through Table C-5 provide the maximum allowable branch length for any detector, module, SIGA-UM, and wire gauge combination. Using the wire distances specified in the tables ensures that the circuit does not exceed the maximum circuit resistance of the Signature data circuit.
Note: To calculate the wire distance with respect to circuit resistance, the tables assume that the circuit is end-loaded (all devices are clustered more towards the end of the circuit) and the circuit uses standard non-shielded wire.

SIGNATURE DATA CIRCUIT MAXIMUM WIRE LENGTH CALCULATIONS

Table C-2: Longest allowable circuit path with 0 SIGA-UMs or SIGA-MABs configured for 2-wire smokes

Signature detector addresses	Signature module addresses	Maximum wire distance using nontwisted, nonshielded wire pairs					
		18 AWG		16 AWG		14 AWG	
		ft	m	ft	m	ft	m
1–25	0	7437	2267	11815	3601	18792	5728
26–50	0	7038	2145	11180	3408	17782	5420
51–75	0	6638	2023	10545	3214	16772	5112
76–100	0	6238	1901	9910	3021	15762	4804
101–125	0	5839	1780	9275	2827	14752	4497
0	1–25	7267	2215	11544	3519	18361	5597
1–25	1–25	6867	2093	10909	3325	17351	5289
26–50	1–25	6467	1971	10275	3132	16342	4981
51–75	1–25	6068	1849	9640	2938	15332	4673
76–100	1–25	5668	1728	9005	2745	14322	4365
101–125	1–25	5268	1606	8370	2551	13312	4057
0	26–50	6697	2041	10639	3243	16921	5157
1–25	26–50	6297	1919	10004	3049	15911	4850
26–50	26–50	5897	1798	9369	2856	14901	4542
51–75	26–50	5498	1676	8734	2662	13891	4234
76–100	26–50	5098	1554	8099	2469	12881	3926
101–125	26–50	4698	1432	7464	2275	11871	3618
0	51–75	5906	1800	9383	2860	14923	4549
1–25	51–75	5250	1600	8340	2542	13265	4043
26–50	51–75	4633	1412	7360	2243	11707	3568
51–75	51–75	4051	1235	6435	1961	10235	3120
76–100	51–75	3498	1066	5558	1694	8839	2694
101–125	51–75	2973	906	4723	1440	7512	2290
0	76–100	3931	1198	6245	1903	9932	3027
1–25	76–100	3404	1037	5407	1648	8601	2621
26–50	76–100	2899	883	4605	1404	7324	2232
51–75	76–100	2413	735	3833	1168	6096	1858
76–100	76–100	1945	593	3089	942	4913	1498
101–125	76–100	1493	455	2371	723	3771	1149
0	101–125	2631	802	4180	1274	6649	2027
1–25	101–125	2165	660	3439	1048	5470	1667
26–50	101–125	1713	522	2721	829	4328	1319
51–75	101–125	1274	388	2023	617	3218	981
76–100	101–125	847	258	1345	410	2140	652
101–125	101–125	431	131	685	209	1089	332

SIGNATURE DATA CIRCUIT MAXIMUM WIRE LENGTH CALCULATIONS

Table C-3: Longest allowable circuit path with 1 to 5 SIGA-UMs or SIGA-MABs configured for 2-wire smokes

Signature detector addresses	Signature module addresses	Maximum wire distance using nontwisted, nonshielded wire pairs					
		18 AWG		16 AWG		14 AWG	
		ft	m	ft	m	ft	m
1–25	0	6778	2066	10768	3282	17126	5220
26–50	0	6131	1869	9741	2969	15492	4722
51–75	0	5501	1677	8739	2664	13899	4236
76–100	0	4885	1489	7760	2365	12342	3762
101–125	0	4282	1305	6802	2073	10819	3298
0	1–25	5353	1632	8504	2592	13525	4122
1–25	1–25	4720	1439	7498	2286	11926	3635
26–50	1–25	4100	1250	6513	1985	10359	3157
51–75	1–25	3491	1064	5546	1691	8821	2689
76–100	1–25	2893	882	4597	1401	7311	2228
101–125	1–25	2306	703	3663	1116	5826	1776
0	26–50	3776	1151	5999	1829	9542	2908
1–25	26–50	3153	961	5009	1527	7966	2428
26–50	26–50	2539	774	4034	1230	6416	1956
51–75	26–50	1935	590	3075	937	4890	1491
76–100	26–50	1340	409	2130	649	3387	1032
101–125	26–50	754	230	1197	365	1905	581
0	51–75	2491	759	3957	1206	6293	1918
1–25	51–75	1868	569	2967	904	4720	1439
26–50	51–75	1254	382	1992	607	3168	966
51–75	51–75	648	198	1030	314	1638	499
76–100	51–75	50	15	80	24	126	39
101–125	51–75						
0	76–100	1386	422	2201	671	3501	1067
1–25	76–100	760	232	1208	368	1921	586
26–50	76–100	143	44	227	69	361	110
51–75	76–100						
76–100	76–100						
101–125	76–100						
0	101–125						
1–25	101–125						
26–50	101–125						
51–75	101–125						
76–100	101–125						
101–125	101–125						

SIGNATURE DATA CIRCUIT MAXIMUM WIRE LENGTH CALCULATIONS

Table C-4: Longest allowable circuit path with 6 to 10 SIGA-UMs or SIGA-MABs configured for 2-wire smokes

Signature detector addresses	Signature module addresses	Maximum wire distance using nontwisted, nonshielded wire pairs					
		18 AWG		16 AWG		14 AWG	
		ft	m	ft	m	ft	m
1–25	0	5045	1538	8015	2443	12748	3886
26–50	0	4494	1370	7139	2176	11355	3461
51–75	0	3950	1204	6275	1913	9981	3042
76–100	0	3414	1040	5423	1653	8625	2629
101–125	0	2884	879	4581	1396	7286	2221
0	1–25	4106	1252	6523	1988	10375	3162
1–25	1–25	3542	1080	5627	1715	8950	2728
26–50	1–25	2985	910	4742	1445	7542	2299
51–75	1–25	2435	742	3868	1179	6152	1875
76–100	1–25	1891	576	3004	916	4778	1456
101–125	1–25	1353	412	2150	655	3419	1042
0	26–50	2869	874	4557	1389	7248	2209
1–25	26–50	2296	700	3648	1112	5802	1768
26–50	26–50	1730	527	2749	838	4372	1332
51–75	26–50	1170	357	1859	567	2957	901
76–100	26–50	617	188	979	299	1558	475
101–125	26–50	68	21	108	33	172	53
0	51–75	1796	547	2853	869	4537	1383
1–25	51–75	1214	370	1929	588	3067	935
26–50	51–75	638	195	1014	309	1613	492
51–75	51–75	69	21	109	33	173	53
76–100	51–75						
101–125	51–75						
0	76–100	833	254	1323	403	2105	642
1–25	76–100	242	74	385	117	613	187
26–50	76–100						
51–75	76–100						
76–100	76–100						
101–125	76–100						
0	101–125						
1–25	101–125						
26–50	101–125						
51–75	101–125						
76–100	101–125						
101–125	101–125						

SIGNATURE DATA CIRCUIT MAXIMUM WIRE LENGTH CALCULATIONS

Table C-5: Longest allowable circuit path with 11 to 15 SIGA-UMs or SIGA-MABs configured for 2-wire smokes

Signature detector addresses	Signature module addresses	Maximum wire distance using nontwisted, nonshielded wire pairs					
		18 AWG		16 AWG		14 AWG	
		ft	m	ft	m	ft	m
1–25	0	3931	1198	6245	1903	9932	3027
26–50	0	3427	1045	5444	1659	8659	2639
51–75	0	2928	892	4651	1418	7397	2255
76–100	0	2432	741	3864	1178	6145	1873
101–125	0	1941	592	3083	940	4903	1495
0	1–25	3247	990	5158	1572	8204	2501
1–25	1–25	2722	830	4324	1318	6878	2096
26–50	1–25	2202	671	3498	1066	5563	1696
51–75	1–25	1686	514	2678	816	4259	1298
76–100	1–25	1174	358	1865	568	2966	904
101–125	1–25	666	203	1058	323	1683	513
0	26–50	2204	672	3502	1067	5570	1698
1–25	26–50	1664	507	2644	806	4205	1282
26–50	26–50	1129	344	1793	547	2852	869
51–75	26–50	598	182	950	289	1511	460
76–100	26–50	71	22	113	34	179	55
101–125	26–50						
0	51–75	1263	385	2007	612	3192	973
1–25	51–75	710	216	1128	344	1794	547
26–50	51–75	161	49	256	78	407	124
51–75	51–75						
76–100	51–75						
101–125	51–75						
0	76–100						
1–25	76–100						
26–50	76–100						
51–75	76–100						
76–100	76–100						
101–125	76–100						
0	101–125						
1–25	101–125						
26–50	101–125						
51–75	101–125						
76–100	101–125						
101–125	101–125						

NETWORK DATA RISER LIMITS

Overview

Cumulative data network capacitance refers to the total capacitance of all copper wire used for the data riser. The cumulative capacitance of data networks must be within certain limits to permit stable network communications. Audio networks are not affected by cumulative capacitance, due to the method of retransmitting data. The audio network retransmits data byte-by-byte, so the individual bit times of a byte are restored at each node in the network. The data network retransmits data bit-by-bit. This method of retransmitting data restores the amplitude of a bit at each node, but any distortions in bit timing are passed through to the next node. Data network communication faults begin to occur at about 23% distortion of bit timing. Cumulative data network capacitance induces bit timing distortion.

A fiber link in a data network electrically isolates two nodes, but distortions in bit timing are *not* restored by the fiber segment. Distortions in bit timing are passed through the fiber to the next node. The bit transition time of model 3-FIB fiber cards is fast enough to be neglected in determining the maximum wire length that can be used in the data network.

Data network specifications

Here are the maximum allowed values between any three nodes of a network.

- Resistance: 90 ohms
- Distance: 5,000 feet
- Capacitance: 0.3 microfarads

The following table lists the maximum cumulative capacitance for the entire data network given various wire sizes and transmission rates. *Maximum cumulative capacitance* is the total capacitance of all installed copper wire used in the data network.

MAXIMUM CUMULATIVE CAPACITANCE IN MICROFARADS

Wire size (AWG)	At 38.4 Kbaud	At 19.2 Kbaud
18	1.4	2.8
16	1.8	3.6
14	2.1	4.2

Cable properties

Data and audio networks in an EST3 system do *not* require the use of shielded cable, and networks designed with twisted-pair can be about twice as long as those designed with shielded cable. The maximum length of a data network varies with the properties of the wire used. Wire manufacturers typically provide specifications for wire resistance and capacitance.

continues on next page

NETWORK DATA RISER LIMITS

Resistance is generally specified in ohms per 1,000 feet, and must be doubled for 1,000 feet of a twisted-pair cable. Capacitance is specified in picofarads per foot (pF/ft). The capacitance between conductors of a twisted-pair is commonly referred to as *conductor-conductor* or *mutual* capacitance. Shielded cable has an additional capacitance between each conductor and the shield. The capacitance of either conductor to shield is typically twice the value of mutual capacitance, and the highest value of capacitance must be used when calculating the maximum length of a data network. The overall length of data networks designed with twisted-pair cable is about twice as long as data networks designed with shielded cable due to the additional capacitance resulting from the shield.

Calculating a maximum length

The maximum length of a data network can be calculated by dividing the maximum cumulative capacitance allowed by the highest capacitance rating of the selected cable. For example, say you wanted to determine maximum length of a data network using 18 AWG cable that is rated at 25 pF per foot. The network will communicate at 38.4 Kbaud. The maximum length equals the maximum cumulative capacitance divided by the capacitance per foot. In equation form:

$$ML = MCC / CPF$$

In our example: ML = 1.4 mF / 25 pF/ft; ML = 56,000 ft

Calculating maximum wire capacitance per foot

The capacitive property of twisted-pair cable varies and the cost of cable generally increases as the capacitance per foot decreases. Following is a sample calculation for determining the maximum capacitance per foot that a cable can have for a given network length. The maximum capacitance per foot equals the maximum cumulative capacitance divided by the total network length. In equation form:

$$MCPF = MCC / TNL$$

Where:
- MCC can be obtained from the table given in this topic
- Total network length is the sum of the lengths of individual copper runs in the network

Example: The total copper distance of a network is 26,000 ft. Calculate the maximum capacitance per foot that can be used for 18 AWG twisted-pair cable at 38.4K baud.

$$MCPF = MCC / TNL$$
$$MCPF = 1.4 \text{ mF} / 26{,}000 \text{ ft}$$
$$MCPF = 53.8 \text{ pF/ft}$$

3-SAC DATA BUS & 3-SAC POWER

3-SAC Data Bus

SAC bus wiring riquirements
Type: unshielded, twisted pair, > 6 twists per foot
Maximum bus length: 4,000 ft (1,220 m) @ 25 pF/ft
Maximum total circuit capacitance: 0.1 μF
Maximum total circuit resistance: 52 Ohms

3-SAC Power

This topic provides information to help you determine whether:

- A power supply must be added to the SAC bus
- Adequate voltage will be available to CRCs and KPDISPs on the SAC bus
- The standby battery in each CRC is properly sized

Determining the need for a remote power supply
The need for additional power is dictated by the current drawn by the devices on the SAC bus. Each 3-PPS/M can supply a total of 7 A through two 3.5 A outputs. Each SAC line can therefore draw a maximum of 3.5 A. This consists of the current drawn by the CRCs and KPDISPs plus any readers, strikes, or maglocks.
If the load on the 3-PPS/M supply is greater than 3.5 A, you'll need to split the devices over two SAC buses, or add a remote power supply.

To determine the total load on the 3-PPS/M:

1. Complete Form A (below) to calculate the system alarm and standby load current.
2. Total the columns to determine the Total Alarm Load and Total Amp Hours. These two totals will be used in later calculations.
3. If the Total Alarm Load is greater than 3.5 A, the devices must be divided between two SAC buses, each with a separate supply — OR — a remote power supply must be installed.
4. If a remote power supply is used a ground wire must be between the 3-SAC and the remote power supply.

SAC BUS POWER

Form A: 3-SAC alarm and standby load

Device	Qty	Alarm current (mA)	Total alarm current (mA)	Standby current (mA)	Total Standby current (mA)	Standby time (Hours)	Amp hours (mAH)
KPDISP		100		35			
CRC		70		60			
CR-5355		72		70			
CR-5365		31		25			
CR-5395		24		20			
CR-6005		20		20			
Reader sounder		8		0			
CRCSND		8		0			
Strike rating							
100 mA @ 12 V		33		0			
150 mA @ 12 V		40		0			
200 mA @ 12 V		42		0			
250 mA @ 12 V		47		0			
300 mA @ 12 V		51		0			
35 mA @ 12 V		55		0			
400 mA @ 12 V		58		0			
450 mA @ 12 V		63		0			
500 mA @ 12 V		65		0			
Maglock rating							
100 mA @ 12 V		80		80			
150 mA @ 12 V		126		126			
200 mA @ 12 V		156		156			
250 mA @ 12 V		187		187			
300 mA @ 12 V		233		233			
350 mA @ 12 V		283		283			
400 mA @ 12 V		376		376			
450 mA @ 12 V		436		436			
500 mA @ 12 V		470		470			
Total alarm load (must be < 3.5 A)							
Total amp hours (Battery)							
Note: Standby time = length of time that the device will draw standby current from battery. There is no minimum standby time for access control.							

SAC BUS POWER

Providing adequate voltage for devices

To determine whether each CRC and KPDISP will have adequate input voltage, calculate the voltage drops along the SAC bus. Voltage drops can be estimated or actual.

Estimated voltage drop
To estimate the voltage drop use Table D-1 and Table D-2, which show the maximum wire length for a given number of doors at a given current load. The tables assume even spacing between the doors and an equal load at each door.

1. First, determine the load per door by adding the alarm currents of the CRC, door lock, card reader, and sounder.
2. Determine the number of doors you need to secure. Find the number of doors Table D-1 then search across that row for the column with the current you calculated in step 1.
3. The intersection gives the maximum distance from the 3-PPS/M or remote power supply to the last door.
4. If the distance to the last door in your installation is less than this distance no further calculations are needed.
5. If the distance to the last door in you installation is greater than this distance check TYable D-2 using steps 1 through 4.
6. If changing the gauge of the wire does not work, you must run a second power line, or divide the SAC bus and add a remote power supply. In either case, recheck your estimates.

For example: You are putting a CRC, a strike rated at 250 mA @ 12 Vdc, a CR-5395 and a CRCSND at 8 doors. The furthest door is 500 feet from the control.
Using step 1 above, you determine that the total alarm current for this door is 149 mA. In Table D-1 (for 16 AWG), find 8 in the Doors column, go across this row to the 150 mA column. The intersection shows a maximum length of 584 feet. Since the distance from the control panel to the last door is less than 584 feet, no further calculations are needed.

Actual voltage drop
To calculate the actual voltage drop based on the actual load for each device and the actual distance between each device, follow the steps on the next page.

SAC BUS POWER

1. Start the EST 3 System Builder program and select the 16 AWG check box.
2. Enter the actual alarm load for the first device and the distance from the control panel to that device. The system will calculate the voltage drop and indicate whether it is OK to continue.
3. Continue by adding the actual alarm load and the distance from the previous device for each device on the SAC bus.
4. If you successfully enter all devices with no error messages, no further calculations are required. The panel supply will be adequate and each device will receive sufficient voltage.
5. If an error message occurs, you have the following options:
   - Repeat the process using 14 AWG in step 1
   - Run a second power supply line
   - Divide the SAC bus and add a remote power supply

Table D-1: SAC bus wire lengths versus number of doors and current loads using 16 AWG wire

Doors	Load (mA)												
	70	100	150	200	250	300	350	400	450	500	550	600	650
1	4000	4000	2650	2000	1600	1300	1140	1000	885	800	720	665	616
2	3800	2660	1776	1300	1060	880	760	666	594	532	484	444	410
3	2850	1950	1320	990	780	660	570	498	444	399	363	333	306
4	2240	1600	1040	800	624	520	452	400	355	320	288	266	244
5	1875	1350	885	650	525	435	375	333	296	266	242	222	205
6	1620	1140	756	558	450	378	324	286	254	228	207	190	X
7	1400	980	665	497	392	329	285	250	222	199	X	X	X
8	1240	880	584	440	352	288	253	222	197	X	X	X	X
9	1125	810	522	396	315	261	228	200	X	X	X	X	X
10	1030	730	480	360	290	240	207	X	X	X	X	X	X
11	946	660	440	330	264	220	X	X	X	X	X	X	X
12	876	600	408	300	240	X	X	X	X	X	X	X	X
13	806	559	377	273	X	X	X	X	X	X	X	X	X
14	756	518	350	X	X	X	X	X	X	X	X	X	X
15	705	495	330	X	X	X	X	X	X	X	X	X	X
16	672	464	304	X	X	X	X	X	X	X	X	X	X
17	629	442	X	X	X	X	X	X	X	X	X	X	X
18	576	414	X	X	X	X	X	X	X	X	X	X	X
19	570	399	X	X	X	X	X	X	X	X	X	X	X
20	540	380	X	X	X	X	X	X	X	X	X	X	X

Note: All distance measurements given in feet. X means that the 3-PPS/M will not support these devices at any distance.

SAC BUS WIRE LENGTH TABLES

Table D-2: SAC bus wire lengths versus number of doors and current loads using 14 AWG wire

Doors	Load (mA)												
	70	100	150	200	250	300	350	400	450	500	550	600	650
1	4000	4000	4000	3000	2400	2000	1750	1500	1360	1200	1100	1000	940
2	4000	4000	2700	2000	1600	1360	1160	1000	900	800	740	680	620
3	4000	3000	2040	1500	1200	1020	870	750	660	600	555	510	471
4	3480	2400	1600	1200	960	800	700	600	544	480	436	400	376
5	2900	2000	1365	1000	800	675	575	500	455	405	365	335	315
6	2460	1710	1140	870	690	582	492	438	390	348	312	X	X
7	2170	1505	1015	756	602	511	434	378	336	301	X	X	X
8	1920	1360	904	680	544	448	384	336	X	X	X	X	X
9	1710	1215	810	612	477	405	351	X	X	X	X	X	X
10	1550	1100	740	550	440	370	310	X	X	X	X	X	X
11	1430	1012	682	506	407	341	X	X	X	X	X	X	X
12	1344	936	624	468	372	X	X	X	X	X	X	X	X
13	1248	858	585	429	351	X	X	X	X	X	X	X	X
14	1162	812	532	406	322	X	X	X	X	X	X	X	X
15	1095	750	510	375	X	X	X	X	X	X	X	X	X
16	1024	720	480	352	X	X	X	X	X	X	X	X	X
17	969	680	442	340	X	X	X	X	X	X	X	X	X
18	918	630	414	X	X	X	X	X	X	X	X	X	X
19	874	608	399	X	X	X	X	X	X	X	X	X	X
20	820	580	380	X	X	X	X	X	X	X	X	X	X

Note: All distance measurements given in feet. X means that the 3-PPS/M will not support these devices at any distance.

REFERENCES

CIRCUIT COMPATIBILITY MATRIX

KEY

- **1** No restriction
- **2** Twisted
- **3** Twisted/Shielded
- (shaded box) Power limited circuit
- ⊘ Do not mix

1/2 — Top note refers to this circuit (column); Bottom note refers to this circuit (row). Cells below are written as top note / bottom note.

Circuits permitted by manufacturer to occupy the same conduit. Check local codes for additional restrictions.

	24 VDC-power limited	Network Audio-digitized	Network Com (RS-485)	25 V_{RMS} Audio-power limited	25 V_{RMS} Audio-not power limited	70 V_{RMS} Audio-power limited	70 V_{RMS} Audio-not power limited	Signature Data Circuit	Addressable Analog "ZAS" Circuit	Traditional 2-Wire IDC	RS-232 Peripheral Data Circuit	Telephone	AC Mains - non power limited	Fiber Optic Cable	Circuit Wiring Specifications
24 VDC-power limited	1/1	2/1	2/1	1/1	⊘	2/1	⊘	1/1	2/1	1/1	2/1	3/1	⊘	1/1	Size conductors per acceptable voltage drop.
Network Audio-digitized	1/2	2/2	2/2	2/2	⊘	2/2	⊘	1/2	2/2	1/2	2/2	3/2	⊘	1/2	Max. Ckt. Res = 70Ω. NO T-Taps Max. Ckt. Capacitance = 0.07µF.
Network Com (RS-485)	1/2	2/2	2/2	2/2	⊘	2/2	⊘	1/2	2/2	1/2	2/2	3/2	⊘	1/2	Max. Ckt. Res = 90Ω. NO T-Taps Max. Ckt. Capacitance = 0.3µF.
25 V_{RMS} Audio-power limited	1/1	2/2	2/2	2/2	⊘	2/2	⊘	1/2	2/2	1/2	2/2	3/3	⊘	1/2	Size conductors per acceptable voltage drop.
25 V_{RMS} Audio-not power limited	⊘	⊘	⊘	⊘	2/2	⊘	2/2	⊘	⊘	⊘	⊘	⊘	⊘	1/1	Size conductors per acceptable voltage drop.
70 V_{RMS} Audio-power limited	1/1	2/2	2/2	2/2	⊘	2/2	⊘	1/2	2/2	1/2	2/2	3/3	⊘	1/1	Size conductors per acceptable voltage drop.
70 V_{RMS} Audio - not power limited	⊘	⊘	⊘	⊘	2/2	⊘	2/2	⊘	⊘	⊘	⊘	⊘	⊘	1/1	Size conductors per acceptable voltage drop.
Signature Data Circuit	1/1	2/1	2/1	2/1	⊘	2/1	⊘	1/1	2/1	1/1	2/1	3/1	⊘	1/1	Max. Ckt. Res = 76Ω. Max. Ckt. Capacitance = 0.5µF.
Addressable Analog "ZAS" Circuit	1/2	2/2	2/2	2/2	⊘	2/2	⊘	1/2	2/2	1/2	2/2	3/2	⊘	1/2	Max. Ckt. Res = 36 w/RZB; 50Ω w/o RZB. Max. Ckt. Capacitance = 0.2µF.
Traditional 2-Wire IDC	1/1	2/1	2/1	2/1	⊘	2/1	⊘	1/1	2/1	1/1	2/1	3/1	⊘	1/1	Max. Ckt. Res = 50Ω.
RS-232 Peripheral Data Circuit	1/2	2/2	2/2	2/2	⊘	2/2	⊘	1/2	2/2	1/2	2/2	3/2	⊘	1/2	Max. length 50 Ft. (15.2 M) without modem.
Telephone	1/3	2/3	2/3	3/3	⊘	3/3	⊘	1/3	2/3	1/3	2/3	3/3	⊘	1/3	#18 AWG Twisted/Shielded. 4,000 Ft. (1,220 M) Max
AC Mains - not power limited	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	1/1	⊘	230V, 20A Max.
Fiber Optic Cable	1/1	2/1	2/1	2/1	2/1	2/1	2/1	1/1	2/1	1/1	2/1	3/1	⊘	1/1	Jacket material must be rated for application.

REFERENCES

PAIGE EST CABLE TABLES

REFERENCE TYPE

- A Initiating Device Circuit (IDC)
- B Notification Appliance (NAC) 24Vdc
- I 24 Vdc Power Distribution (Aux. Pwr)
- N Relay Module (ZR8 or FSRRM)

PAIGE PART NUMBERS			NON-PLENUM			PLENUM	Outdoor or Direct Burial
AWG	COND	DESCRIPTION	TFN or THHN	FPL	FPLR	FPLP	
18	2	Twisted	4318BR	--->	4703A	4709A	1802WDB
		Flat - No Twist	--->	4700A	--	--	--
	4	Twisted	--->	--->	4704A	4711A	call Paige
16	2	Twisted	4316BR	--->	4731A	4740A	1602WDB
		Flat - No Twist	--->	4701A	--	4758A	--
	4	Twisted	--->	--->	4724A	4741A	call Paige
14	2	Twisted	4314BR	--->	4718A	4719A	1402WDB
		Flat - No Twist	--->	4702A	--	4755A	--
	4	Twisted	--->	--->	4732A	4743A	call Paige
12	2	Twisted	--->	--->	4720A	4725A	1202WDB
Refer to Paige section page #:			25	37	26	29, 37	67

REFERENCE TYPE

- C Notification Appliance Circuit (Audio)
- D Signature Addressable Loop
- E Analog Addressable Loop

PAIGE PART NUMBERS			NON-PLENUM		PLENUM	Outdoor or Direct Burial
AWG	COND	DESCRIPTION	TFN / THHN	FPLR	FPLP	
18	2	Twisted	4318BR	4703A	4709A	1802WDB
16	2	Twisted	4316BR	4731A	4740A	1602WDB
14	2	Twisted	4314BR	4718A	4719A	1402WDB
12	2	Twisted	--->	4720A	4725A	1202WDB
Refer to Paige Section page #:			25	26	29	67

Paige DISTINGUISHER versions are available with color-coded jacket stripes for easy identification. See Paige section pp. 32-34. Metal Clad (MC) versions of TFN or THHN are available. See Paige section page 38-40.

PAIGE EST CABLE TABLES

REFERENCE TYPE

H Fireman's Telephone

PAIGE PART NUMBERS			NON-PLENUM	PLENUM	Outdoor or Direct Burial
AWG	PAIRS	Description	FPLR	FPLP	
18	1	Twisted & Shielded	4722A	4717A	1802SDB
16	1	Twisted & Shielded	4736A	4747A	1602SDB
14	1	Twisted & Shielded	4726A	4727A	1402SDB
12	1	Twisted & Shielded	4739A	4750A	1202SDB
Refer to Paige section page #:			27	30	68

Paige DISTINGUISHER versions are available with color-coded jacket stripes for easy identification. See Paige section pp. 32-34.

REFERENCE TYPE

L Card / PIN Reader

M Security Device Circuit

PAIGE PART NUMBERS			NON-PLENUM		PLENUM		Outdoor or Direct Burial
AWG	COND	DESCRIPTION	CMR	FPLR	CMP	FPLP	
22	2	Twisted	4606A	--	4628A	--	--
18	2	Twisted	4640A	4703A	4641A	4709A	1802WDB
16	2	Twisted	4656A	4731A	4694A	4740A	1602WDB
Refer to Paige section page #:			7 - 8	26	15 - 16	29	67

Stranded security and sound cables rated CM, CMR, and CMP may also be used. See Paige section pages 5-22.

Paige DISTINGUISHER versions are available with color-coded jacket stripes for easy identification. See Paige section pages 32-34.

PAIGE EST CABLE TABLES

REFERENCE TYPE

K Security (3-SAC) Data Bus

Per circuit maximums for type K circuits:

Capacitance = 0.1 microfarads, Resistance = 52 ohms, Distance = 4000 ft

Cables shown below are twisted, non-shielded

Paige part #s		NON-PLENUM			PLENUM		
AWG	COND.	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft
18	2	4703A	6.4	33	4709A	6.4	33
16	2	4731A	4.1	35	4740A	4.1	35
14	2	4718A	2.6	38	4719A	2.6	39
12	2	4720A	1.7	40	4725A	1.7	42

Paige part #s		Outdoor or Direct Burial			Notes
AWG	COND.	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft	Mutual Capacitance is Nominal pico-Farads per foot. DC Resistance is Nominal Ohms per 1,000'.
18	2	1802WDB	6.4	31	
16	2	1602WDB	4.1	34	
14	2	1402WDB	2.6	36	
12	2	1202WDB	1.7	40	

EXTENDED DISTANCE							
Paige part #s		NON-PLENUM			PLENUM		
AWG	COND.	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft
18	2	47032	6.4	16	For low capacitance, extended distance, plenum options, call Paige		
16	2	47311	4.1	19			

Paige DISTINGUISHER versions are available with color-coded jacket stripes for easy identification. See Paige section pp. 32-34.

REFERENCES

PAIGE EST CABLE TABLES

REFERENCE TYPE

T Audio Network

U RS-485 Communications Network

Per circuit maximums for type T & U circuits:

Capacitance: 0.3 microfarads; Resistance: 90 ohms, Distance = 5000 ft

Paige part #s		NON-PLENUM			PLENUM		
AWG	COND.	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft
18	2	4703A	6.4	33	4709A	6.4	33
16	2	4731A	4.1	35	4740A	4.1	35
14	2	4718A	2.6	38	4719A	2.6	39
12	2	4720A	1.7	40	4725A	1.7	42

Paige part #s		Outdoor or Direct Burial			Notes
AWG	COND.	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft	Mutual Capacitance is Nominal pico-Farads per foot. DC Resistance is Nominal Ohms per 1,000'.
18	2	1802WDB	6.4	31	
16	2	1602WDB	4.1	34	
14	2	1402WDB	2.6	36	
12	2	1202WDB	1.7	40	

EXTENDED DISTANCE							
Paige part #s		NON-PLENUM			PLENUM		
AWG	COND.	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft
18	2	47032	6.4	16	For low capacitance, extended distance, plenum options, call Paige		
16	2	47311	4.1	19			

PAIGE EST CABLE TABLES

REFERENCE TYPE

S RS-232 Communications (Printer / Fireworks)

Paige part numbers			Non-plenum	Plenum
AWG	COND	DESCRIPTION	FPLR/CMR	FPLP/CMP
22	4	Twisted	4608A	4629A
18	4	Twisted	4704A	4711A
Refer to Paige section page #:			7, 26	15, 29

50' Max. Panel to Printer or Panel to Fireworks. Stranded security and sound cables rated CM, CMR, and CMP may also be used. See Paige section pages 5-22.

REFERENCE TYPE

V Fireshield Serial Communication Bus

Per circuit maximums for type V circuits:

Capacitance: 0.03 microfarads; Resistance: 13 ohms; Distance: 1000 ft @ 18 AWG

Paige Part #s		Non-plenum		
AWG	COND.	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft
18	2	4703A	6.4	33
16	2	4731A	4.1	35
14	2	4718A	2.6	38
12	2	4720A	1.7	40
Paige Part #s		Plenum		
AWG	COND.	Part #	DC Res Ohms / 1,000'	Mutual Capacitance pF / ft
18	2	4709A	6.4	33
16	2	4740A	4.1	35
14	2	4719A	2.6	39
12	2	4725A	1.7	42
Paige Part #s		Outdoor or Direct Burial		
AWG	COND.	Part #	DC Res Ohms / 1,000"	Mutual Capacitance pF / ft
18	2	1802WDB	6.4	31
16	2	1602WDB	4.1	34
14	2	1402WDB	2.6	36
12	2	1202WDB	1.7	40

Other: Mutual Capacitance is Nominal pico-Farads per foot.
DC Resistance is Nominal Ohms per 1,000'.

Paige DISTINGUISHER versions are available with color-coded jacket stripes for easy identification. See Paige section pp. 32-34.

PAIGE EST CABLE TABLES

REFERENCE TYPE

W Network Fiber Optics

Paige part numbers			
	Non-plenum	Plenum	Outdoor or Direct Burial
# Fibers	OFNR	OFNP	Tight Buffered / OFNP
2	74LV00262	74DP002648	74KP002648
4	74LV004641	74UP004648	74KP004648
6	74LV006661	74CP006644	74KP006655
Refer to Paige section page #	81	80	82
All items are multi-mode 62.5/125			

REFERENCE TYPE

X Netcom 16D Router

Paige part numbers			Non-plenum	Plenum
AWG	PAIRS	Category	CMR	CMP
24	4	5E	710548E	710536E
24	4	6	710648	710636
Refer to Paige section page #:			53, 58	54, 58

REFERENCE TYPE

Y Fireworks Short-haul Modems

Paige part numbers			Non-plenum	Plenum
AWG	PAIRS	Category	CMR	CMP
24	2	3	710512	710515
24	4	3	710514	710516
Refer to Paige section page #:			51	52

INSTALLER'S

WIRE GUIDE

The EST Installer's Wire Guide is a concise reference to wire and cable requirements for EST products and systems. This valuable resource provides installers, as well as service and maintenance personnel, with at-a-glance information and more than one hundred wiring diagrams – all cross-referenced to easy-to-read wire charts. Well-organized and easy-to-use, the EST Installer's Wire Guide is designed to be part of every technician's basic toolkit.

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